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**LYNCH**



**AMERICAN RED CROSS ABRIDGED TEXT-BOOK**

**ON**

# **FIRST AID**

**GENERAL EDITION**

**A MANUAL OF INSTRUCTION**

**BY**

**MAJOR CHARLES LYNCH**

**MEDICAL CORPS, UNITED STATES ARMY**

**Prepared for and Endorsed by the American Red Cross**

**WITH 55 ILLUSTRATIONS**

**PHILADELPHIA**

**P. BLAKISTON'S SON & CO.**

**1012 WALNUT STREET**

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**REPRINTED FEBRUARY, 1911.**

**REPRINTED AUGUST, 1911.**

**REPRINTED MARCH, 1912.**

**REPRINTED NOVEMBER, 1912.**

**REPRINTED FEBRUARY, 1913.**

**REPRINTED AUGUST, 1913.**

**REPRINTED FEBRUARY, 1914.**

**REPRINTED NOVEMBER, 1914.**

**REPRINTED FEBRUARY, 1915.**

**REPRINTED AUGUST, 1915.**

**REPRINTED DECEMBER, 1915.**

**REPRINTED FEBRUARY, 1916.**

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# PREFACE.

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## GENERAL EDITION.

This edition is one of a series which are being published under the auspices of the American Red Cross on the subject of First Aid to the Injured. The body of all these editions will be identical, as the most essential facts in respect to first aid are the same, but in order to adapt each to the needs of the particular class for which it is designed appropriate chapters have been added to the body of the book for each edition.

The industrial edition which has already been published is better adapted to the special needs of workmen in that field and its use for them is advised. This edition is for *general* use.

As the experience of the author increases in first-aid instruction he is more and more convinced of the benefits to be gained therefrom and impressed with the fact that anyone of ordinary intelligence can learn how to administer first aid if he seriously desires to do so, and the subject is well taught. This serious purpose must be furnished by the student and it is hoped the present manual fills its mission in teaching as well as may be. As is the case with most practical subjects, however, a good teacher is highly desirable if not absolutely essential; and the services of such a teacher should be obtained by every class when practicable.

The American Red Cross is prepared to arrange for the examination of first-aid classes on the conclusion of courses of instruction on this subject. Successful candidates may obtain certificates of proficiency of that association. Similar examinations are held by the Y. M. C. A. which grants a combined certificate with the Red Cross. Full information in regard to these matters may be obtained from the First Aid Department, American Red Cross, Washington, D. C.

# INTRODUCTION.

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Everybody knows that within a comparatively few years better knowledge of the causes of many diseases has enabled us to reduce deaths from them to a very great extent. Take the most common disease, tuberculosis or consumption for example—the exact knowledge of how it is spread and general instruction in the subject and better treatment have reduced death therefrom about one-half. It is even supposable as time goes on many diseases will be so well understood that they will be banished from our midst.

With the prevention of disease it would seem that every year many more persons should die of old age, and this is the case. But with the lessened number of deaths from disease, are deaths from violence also less? Quite the contrary. The following shows what has happened on railways alone during the past few years.

## **Railroads, 1888-1907.**

Killed. ....	153,336
Injured. ....	1,042,486

It is safe to say with the increased use of machinery in the daily life of all of us injuries from accidents are liable to continue to increase instead of to decrease and it is very important that every one should learn *first* how to prevent accidents and *second* how to treat them.

It is realized that prevention is many, many times better than

cure and that prevention in the main is dependent on the individual exercising common care.

This subject is taught in the present manual. Just as with tuberculosis, study of the methods of preventing accidents will well repay the effort. It will be noted that in speaking of tuberculosis it was stated that better treatment was one of the factors which had operated to lessen deaths from this disease. Better treatment is equally effective in accidents. In disease this treatment is practically always given by a doctor as it always should be. Is this the case in accidents? Certainly the services of a doctor are always demanded except for trivial injuries, but the vast majority of accidents occur when no doctor is on the spot—then if you know what to do and what not to do you can save a life or make the effects of the injury much less severe. General knowledge of how to prevent accidents can be made just as effective as general knowledge of how to prevent disease; and good treatment of the injured is as important as good treatment of the sick. Moreover, for the early treatment of injured a doctor is often not available and so knowledge of first aid is of great value.

Two classes of students are encountered in teaching first aid. The former studies the subject theoretically rather as a matter of general education without intending to make practical application of the lessons taught and in fact without being well prepared to do so on account of lack of practical teaching, and the other practises all the various dressings, bandages, etc., so that in case of need he can give a comrade excellent attention. Without question the latter method is capable of the best results, but the former is not without benefit to the student.

# AMERICAN RED CROSS ABRIDGED TEXT-BOOK ON FIRST AID.

GENERAL EDITION.

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## CHAPTER I.

### STRUCTURE AND MECHANICS OF THE BODY.

A workman, in order that he may repair his machine, must know exactly how it is made and how it operates. This is exactly the knowledge which a surgeon should have of the human body. The latter is such an extremely complicated mechanism, however, that months and years are needed to acquire such knowledge. Fortunately, it is not necessary for the first-aid student to go far into these subjects. His efforts to relieve suffering should be confined to emergency treatment. To render this intelligently it is necessary to know comparatively little of the structure and mechanics of the human body or, in technical terms, of anatomy and physiology.

In this chapter will be found all facts on these two subjects which are necessary for the student of first aid. But even the comparatively simple anatomy which he must know cannot be learned from books alone. What is said here should, therefore, be added to by careful study of the skeleton and of the form of its more important bones and of his own body or, better, that of a comrade. Thus the positions and relations of the more important

structures may be clearly pictured in his mind. Good charts such as those of the Red Cross may be made of considerable assistance to him in this connection.

## THE BODY.

The body is composed of hard and soft parts. The bones are the hard parts and the muscles and the internal organs, such as the heart, lungs, liver, etc., constitute the soft parts.

## BONES.

The bones are hard and firm and together make up the Skeleton.  
**The skeleton—**

Forms a strong and rigid frame-work for the body.

Supports and carries the soft parts.

Protects vital organs from injury.

Gives attachment to muscles.

Forms joints so that movements are possible.

The skeleton is divided into three parts:

1. **The Head**, made up of the Cranium, a bony case which encloses and protects the brain; and the Face, with the eyes, ears, nose and mouth. The only movable bone in the head is the lower jaw.

2. **The Trunk**, which is divided into two parts by a muscular partition—the diaphragm. The upper portion is the Chest, which contains the esophagus or gullet, the lungs, the heart and some large blood-vessels. The lower portion is the Abdomen, in which are found the stomach, liver, kidneys, bladder, the intestines and other organs.

The trunk is formed of several bones which are of interest to the first-aid student.

*The Spinal Column*, a strong pillar with several curves, is made

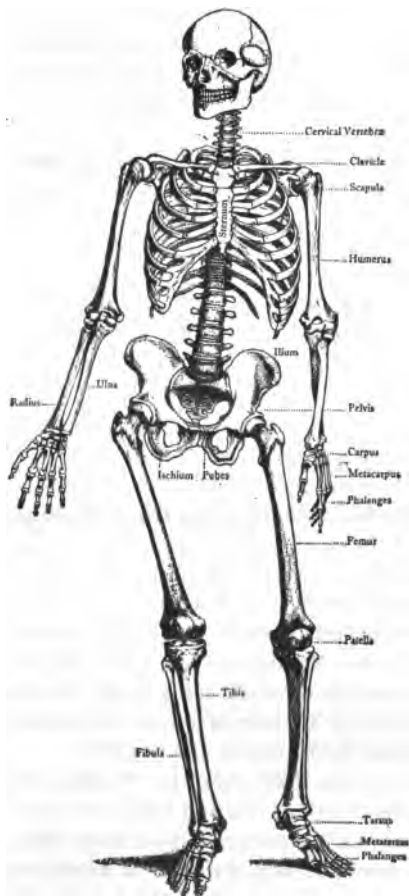


FIG. 1.—The skeleton. (Holden.) Digitized by Google



up of a number of bones called *vertebræ* with a softer substance called cartilage between them. At its lower end, the spinal column terminates in the broad Sacrum or Rump Bone and the pointed Coccyx. The spinal column supports the head and the ribs, and is itself supported on the pelvis.

*The Ribs*, 12 in number, form the greater part of the walls of the chest. All the ribs are connected to the spinal column behind, but the two lower ones on each side are shorter than the others and are not connected to anything in front. The 10 upper ones on each side are united to the Breast-bone.

*The Breast-bone or Sternum* is a flat, dagger-shaped bone which forms the front of the chest. Above it forms joints with the Collar-bones, or Clavicles, being notched for the purpose on each side.

*The Pelvis* is a wide, strong, bony basin formed of the Haunch bones (*ilia*) at the front and sides and partly behind where it is closed by the sacrum and coccyx. It supports the trunk and forms joints with the lower limbs.

**3. The Extremities Comprising the 2 Upper and the 2 Lower Limbs.** Each upper limb is made up of the Scapula or Shoulder-blade, a flat, triangular bone at the back of the shoulder; the Clavicle or Collar-bone, a curved long bone placed horizontally across the upper part of the chest above the first rib; the Humerus, the bone of the upper arm; the Radius and the Ulna, the two bones of the forearm; and the Hand, which has 8 small, irregular bones in the Carpus or wrist, five Metacarpal Bones for the hand itself, and 14 bones, Phalanges, in the fingers and thumb.

Each lower limb is made up of the Femur or Thigh-bone; the Patella or Knee-cap; the Tibia and Fibula, the two leg bones; and the Foot. The foot is made up of the Tarsus, with seven irregular bones, which form the heel, part of the ankle, and the instep, 5 Metatarsal Bones for the middle of the foot; and the toes with 14 bones, Phalanges.

The principle interest which bones have for the student of first aid is that they may be broken or fractured, one of the commonest accidents. (See Fractures, page 63.)

## JOINTS.

Wherever two or more bones are in contact or touch each other they form a joint. The ends of bones forming a joint are covered with a smooth substance called cartilage or gristle, so that they may move without friction on each other. Joints are hermetically closed by a flexible sac, the capsule, which secretes an oily fluid. This fluid lubricates a joint just as oil does an engine. The ligaments of a joint are strong, fibrous bands which hold the bones together. The most important joints to study are the hip and shoulder, which are ball-and-socket joints having movements in all directions, and the elbow, wrist, knee and ankle, hinge joints. These have only to and fro movement like an ordinary hinge.

Joints are of importance to the student, as bones are liable to be put out of place or dislocated at the joints. (See Dislocations, page 59.)

## MUSCLES.

The movements of bones at the joints are caused by the Muscles.

The muscles, the flesh or meat, form two-fifths of the body by weight. They are made up of red fibres which have the power of shortening or contracting, so that if one end of a muscle is fixed and the muscle is contracted the other end will pull on and move whatever it is attached to. By doing this muscles cause all the movements of the body. For example, the biceps, the big muscle at the front of the upper arm, by contracting causes the elbow joint to bend by bringing the forearm closer to the upper arm. All muscles are somewhat on the stretch, as otherwise prompt movement would be impossible. Some of the muscles are attached to



FIG. 2.—The muscles. (Brubaker.)

bones by Tendons or sinews. These are strong, fibrous cords. They may be well seen in the wrist.

Muscles are of two classes: Voluntary muscles, such as those of the arm and leg—these are under the control of the will; and Involuntary muscles, such as the heart—these work independently of the will. By this wise provision of Nature all vital processes go on without our being compelled to give any thought to them.

Voluntary muscles are of prime interest both in fractures and in dislocations, as their pulling causes displacements and their resistance offers the chief obstacle to setting fractures and to reducing dislocations. (See Fractures and Dislocations, pages 63 and 59.)

## CIRCULATION.

**The Heart.**—In order that the blood may reach all parts of the body it is, of course, necessary that some force shall propel it. This is provided by the Heart, which is not the seat of the feelings, but a most skillfully devised pumping machine.

The heart is about the size of a man's fist and is located in the chest between the lungs. It is a hollow, muscular organ, with valves which close and prevent the blood from flowing backward, all its force being expended to send the blood forward. The beat of the heart which we feel in the chest is its contraction by which it is made smaller inside, thus forcing the blood to the furthest parts of the body. After the heart contracts it dilates or becomes larger inside and the valves open so that it may fill with blood. The next contraction again forces the blood forward, and so on as long as a person is alive.

The heart contracts usually about 72 times per minute.

While, as has just been stated, the heart is a pump, it is not a single but a double pump, being divided into two entirely separate halves by a muscular partition. The left side of the heart, or the

left pump, drives the blood through the body, and the right side drives it through the lungs alone.

**Blood-vessels.**—A series of closed tubes, or blood-vessels, as they are called, carry the circulating blood. They are of three classes: 1, Arteries; 2, Capillaries, and 3, Veins.

1. **Arteries.**—Leaving the left side of the heart is the largest artery in the body—the Aorta. This strong tube is just about large enough so that a man's thumb may be introduced into it if it is separated from the heart. It soon divides into branches which again branch and rebranch, the individual branches constantly growing smaller in size, to reach finally the furthest parts of the body. It should be remembered, too, that the smaller branches of the arteries join freely with one another. The blood passes from the heart to the aorta and thence to the smaller arteries, not in a steady stream but in waves, each of which is produced by a contraction of the heart. The beat of these waves causes the Pulse, which may be felt not only at the wrist and temple, but also anywhere else an artery is near enough the surface of the body. Naturally, if an artery is cut, there will not be a steady stream flowing from it, but the blood will be expelled in spurts or jets. The walls of arteries, especially those of large calibre, remain apart when divided.

As the course of the blood in the arteries is away from the heart toward the extremities and the head, if an artery is cut, in order to stop the bleeding the artery must be compressed either on the side of the heart or on the bleeding point itself. Pressure on the further side of the cut will, as may be easily understood, do no good so far as stopping bleeding from an artery is concerned. It is also necessary to press on the artery on the near or heart side as close to the bleeding point as possible. This is because arteries in their branching and re-branching join each other, and if pressure is made on an artery far above the bleeding point, so many branches

may bring blood into it between the point of pressure and the bleeding point that a great deal of blood will be lost, notwithstanding the fact that the main branch is blocked by pressure at a distant point. However, it is not in every part of the body that arteries lie near enough to the surface to be compressed in their course. Moreover, it is necessary in compressing an artery to select a point where a nearby bone gives a hard surface to press against. Therefore, the student of first aid must know, first, the situation and course of the principal arteries and, second, the points on which pressure will be effective.

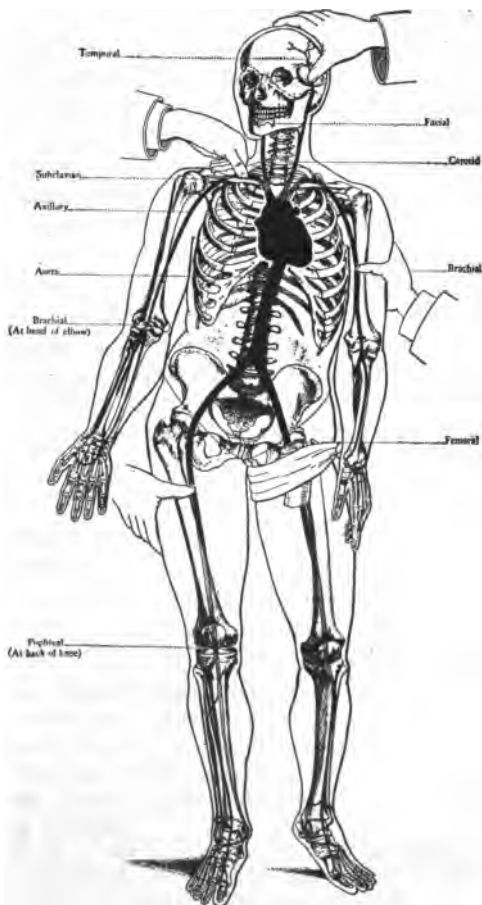
The aorta has three great branches which are of particular interest to the student of first aid. One of these, the Carotid, supplies the head and neck with blood; the second, the Subclavian, the upper extremity; and the third, the Femoral, the lower extremity.

The table which follows gives certain necessary information regarding these arteries and their branches.

Artery	Course	Point on which to exert pressure
--------	--------	----------------------------------

#### HEAD AND NECK.

Carotid .....	From upper, outer edge of breast-bone to angle of jaw.	Deep. Down and back, an inch to the outer side of Adam's apple.
Facial (a branch of carotid).	Diagonally across the lower jaw from below upward.	On the face, an inch in front of the angle of the lower jaw.
Temporal (a branch of carotid).	Upward one-half inch in front of ear.	On skull, immediately in front of upper part of ear or on temple.



**FIG. 3.—The arteries and pressure points.**

## UPPER EXTREMITY.

Artery	Course	Point on which to exert pressure
Subclavian.....	Across the middle of first rib to arm pit.	Deep. Down and back over centre of collar-bone on first rib. Shoulder should be drawn down first.
Brachial (a branch of a branch of the subclavian).	Descends along inner side of biceps muscle; about line of seam of coat, to just below centre of crease at bend of elbow.	Against humerus by grasping and pulling biceps to outer side. Or at elbow by putting a tight roll of cloth or a rolled bandage in bend of elbow, and bending up arm as much as possible.

## LOWER EXTREMITY.

Femoral.....	Down thigh from pelvis to knee, line from middle of line between point of hip and centre of pelvis in front to inner side of knee.	Against femur high up inner side in line given about three inches below upper end of line.
Popliteal (a continuation of the femoral).	Down in middle of space at the back of knee-joint.	In bend of knee as described for elbow.



Arterial bleeding is always more serious than other bleeding because blood thrown out in jets from the cut artery with each contraction of the heart is rapidly lost. The blood which spurts from an artery is always bright red in color, as arterial blood has not yet lost the characteristic bright red of the oxygenated blood from the lungs.

2. **Capillaries.**—The arteries, as they go further and further from the heart, become smaller and thinner-walled, till they finally terminate in still smaller vessels which are called capillaries, from the Latin word meaning a hair. The capillaries form a delicate network of vessels everywhere, and give the rosy color to the skin. Slight pressure on the skin will cause a white spot to appear. This is because the pressure has forced the blood from the net-work of capillaries and the white skin is seen instead of the rosy color due to the presence of the blood in the capillaries. In capillaries the pulse, or contraction wave from the heart, is no longer apparent, as these fine, hair-like tubes break up the waves. Slight cuts or pricks of the skin are sufficient to divide some capillaries and therefore to cause bleeding. Naturally, on account of the minute size of these vessels, bleeding from them, except from a very large surface, is not dangerous to life. Capillaries branch so freely that pressure used to check capillary bleeding, to be effective, must be made on the bleeding point.

The blood lost from capillaries is no longer bright red in color like that from arteries, but is somewhat darker.

3. **Veins.**—The blood-vessels which return the blood to the heart from the points furthest from it are called veins. They may be easily recognized as the blue lines under the skin. Capillaries unite to form small veins, these unite to form larger veins, and finally these vessels become very large before entering the right side of the heart. The best known of the large veins is probably the jugular vein of the neck. Bleeding from a cut vein is in a

continuous flow instead of in jets as is the case with bleeding from arteries, and it is mainly through this difference that one distinguishes venous from arterial hemorrhage. Venous blood, too, is dark, bluish-red in color, as the oxygen in the blood stream is lost in its passage through the capillaries. While bleeding from veins has not the almost terrifying appearance of arterial bleeding, a dangerous amount of blood may be lost from a large vein. As the course of the blood in the veins is toward the heart, in stopping bleeding from them pressure must never be made on the side toward the heart, but on the bleeding point or on the side away from the heart.

**The Blood.**—The blood is a fluid which carries properly prepared food, oxygen, and heat to feed and warm all parts of the body, from which it also removes waste materials for final expulsion. These processes go on constantly as long as life lasts. Coagulation or clotting is the property of the blood which is of most interest to the student of first aid. While the blood is circulating in the living vessels it remains fluid, but as soon as this influence is removed it coagulates or clots, thus tending to stop bleeding. It is easy to see if Nature did not provide this safeguard that the slightest scratch sufficient to draw blood would result in the loss of all the blood in the body. The rate of loss would be regulated simply by the size of the opening just as is that of water flowing from a pipe. Very rarely a person is found whose blood does not clot. These people are called "bleeders," and they often bleed to death from a trivial injury, such as the pulling of a tooth.

In order that one may know what to do to stop bleeding, it is necessary to know what conditions favor or impede coagulation of the blood. First in importance, in order that blood may clot, is comparative rest. A spouting stream of blood will never clot except where it falls and is therefore at rest. Free exposure to air also favors clotting. Coagulation is likewise more promptly

effected by contact with foreign substances, especially if they afford many points on which clots may form. Gauze is a good example of such a material. Cobwebs are also, and they were much used even by surgeons before the danger of dirt in a wound was so well understood.

For further discussion of this subject, see Hemorrhage, page 81.

## RESPIRATORY SYSTEM.

The Respiratory System consists of the Nose and Mouth, the Windpipe and the Lungs. All of these organs except the lungs may be regarded simply as the passageway for the air going to and coming from the lungs. Naturally, anything which blocks this air in its course will interfere with the supply of air to the lungs and complete blockage will result in early death from smothering or asphyxiation.

At the upper end of the windpipe is the Larynx, part of which we know as the prominent Adam's Apple in the throat. As the larynx is in front and the gullet is behind, food passing to the latter must pass over the upper end of the larynx and would enter it if some protection were not provided. This is afforded by the Epiglottis, a muscular flap or curtain which falls into position, covering the upper end of the larynx so that ordinarily food does not enter it. Sometimes, however, the epiglottis does not do this, especially if one swallows quickly or attempts to talk while swallowing. In this case choking results from food entering the larynx, or, in common words, one has swallowed the wrong way. The attempt to give food or water to an unconscious person will also result in choking him because his epiglottis does not close.

The Lungs may be described as two soft, spongy structures, each of which is bag-like in shape and is made up of air cells with

many blood-vessels surrounding them; they are sometimes compared to a bunch of grapes. The lungs are hermetically enclosed in the chest, so that when the cavity of the chest is increased or diminished in size, the same effect is produced on the lungs themselves. Certain muscles are of great importance in filling and emptying the chest and lungs. Ordinarily, the muscular movement consists simply of the bellows action of the chest and the up and down movement of the diaphragm. In order that the chest may be enlarged to its greatest capacity, however, some of the muscles of the upper extremity must also take part. In order that they may do so, the arms are raised vertically above the head, so that certain muscles attached to the chest wall and to the upper extremities will, when the latter are fixed, raise the ribs and thus enlarge the chest. The chest, too, is elastic and direct pressure upon it will diminish its size and so force the air from the lungs. (See Artificial Respiration, page 107.)

The rate of respiration is 16 per minute.

The lungs aerate or oxygenate the blood. The small blood-vessels surrounding the air cells which the pure air breathed in finally reaches, carry dark blood which has lost its oxygen in the body. This blood receives oxygen from the pure air and returns to the heart as bright arterial blood. The air which is expired from the lungs has not only lost its oxygen to the blood, but has also received certain impurities from the latter.

## DIGESTIVE SYSTEM.

This is the system by which the food is received and prepared for the use of the body. From the mouth the food enters the Esophagus or Gullet through which it passes to the stomach and then to the Small and Large Intestines from which the residue is expelled.

## NERVOUS SYSTEM.

Through the Nervous System the actions and functions of the various parts of the body are performed, regulated and controlled. This system is really double. One part is composed of the Brain, Spinal Cord and Nerves connected with them, and the other is the so-called Sympathetic Nervous System.

## SPECIAL SENSES.

### THE EYE.

The Eye is the organ of sight. It is a ball surrounded by three coats. Covering the eyeball in front is a delicate membrane

called the Conjunctiva. Protection to this membrane is afforded by the eyelids when they are closed, but when they are open it is very liable to injury and to the entrance of foreign bodies. These are commonly spoken of as "something in the eye." On account of the sensitiveness of the conjunctiva, they cause much pain and distress. The eyeball itself is well protected from injury, as it is situated deeply in the head and the brows overhang it. Pointed objects may, however, enter it. When this occurs severe damage almost always results.



FIG. 4.—The eye. (*Potter's Anatomy.*)

### THE EAR.

The Ear is the agent of hearing. Leading from the outer ear which we see is the auditory canal which ends in the Ear Drum.

Rupture of the drum is a very serious accident as it results in deafness. It is caused by a loud concussion near the ear, or by putting objects, especially pointed ones, into the auditory canal, as well as by disease.

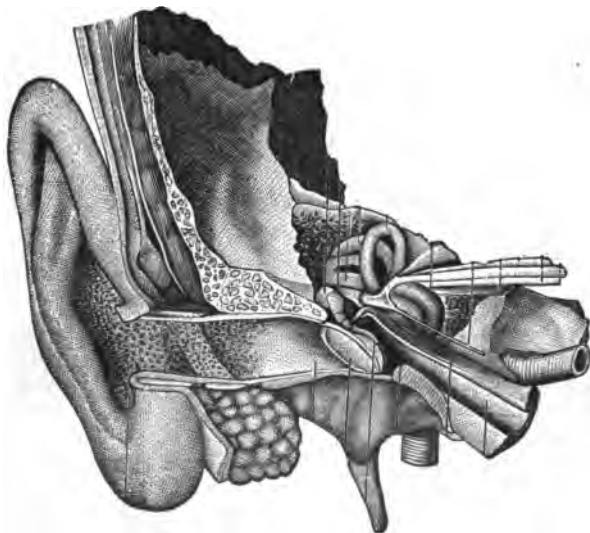


FIG. 5.—The ear. (*Gould's Dictionary.*)

## THE SKIN.

The Skin covers the entire body. Under it is a fatty layer, the padding, which assists it to prevent the escape of the body heat which is produced by chemical processes in the interior of the body.

One of the most important functions of the skin is to act as a defense against the introduction of germs into the tissues of the

body. Germs cannot pass through the unbroken skin, and any injury which is accompanied by a break in the skin makes a breach in this defense and is therefore much more serious.

### QUESTIONS.

1. Of what is the body composed?
2. What is the skeleton and what does it do as a part of the body?
3. Of what parts is the head made up?
4. Into what two parts is the trunk divided and what does each contain?
5. Describe the spinal column; the ribs; the breast-bone; and the pelvis.
6. Of what bones is the upper extremity formed? The lower extremity?
7. What is a joint?
8. What movements do joints have? Give an example of a ball-and-socket, and a hinge joint.
9. What are the muscles?
10. What is the purpose of the muscles?
11. What is the difference between voluntary and involuntary muscles?
12. What is the importance of muscles in reference to fractures and dislocations?
13. What is the purpose of the heart? Describe its action.
14. What is the heart beat and how often does it occur?
15. What are the different classes of blood-vessels; describe each.
16. What are the characteristics of bleeding from an artery?
17. In bleeding from an artery where would you press, and why?
18. Give the points of pressure for the following arteries: Carotid, Facial, Temporal, Subclavian, Brachial (2), Femoral, and Popliteal.
19. What are the characteristics of bleeding from capillaries?
20. How would you stop bleeding from capillaries, and why?
21. What are the characteristics of bleeding from veins?
22. How would you stop bleeding from veins?
23. What is the blood? What does it do?
24. Describe clotting of the blood?

25. What helps to make the blood clot?
26. Of what does the respiratory system consist?
27. Why would you not give food or water to an unconscious person?
28. Describe the action of the lungs? What is the purpose of the lungs?
29. What is the purpose of the digestive system?
30. What is the purpose of the nervous system?
31. What may cause a rupture of the ear drum?
32. Why does something in the eye cause so much pain and distress?
33. What is the purpose of the skin?

### PRACTICAL EXERCISES.

(In order to make such exercises of value a "subject" on which to illustrate will usually be necessary. A small boy should be procured for this purpose or a member of the class may be asked to volunteer.)

Show the bones and joints on a chart of the skeleton.

Show some of the muscles on the subject and explain the action of the muscles in fractures and dislocations.

Show the circulation on the chart.

Show the points on which pressure should be made on arteries on the subject.

Illustrate the action of the muscles in respiration on the subject.

Describe the eye on the subject.



## **CHAPTER II.**

### **FIRST-AID MATERIALS.**

**BANDAGES; COMPRESSES; SPLINTS; TOURNIQUETS; HEAT; COLD;  
STIMULANTS; EMETICS.**

It is almost as important for the workman responsible for the operation of a machine to know how to make practical use of the tools which he requires to repair it as to know how the machine is constructed and how it operates. This is equally true for the first-aid student. Therefore, this chapter is devoted to his tools and repair materials.

### **BANDAGES.**

Bandages are used for the following purposes:

To keep dressings in place.

To fix splints.

To stop bleeding by pressure.

As slings.

Whatever the bandage used, care must be taken that it is not put on too tightly. It should be firm and secure, but must not be so tight that it presses and constricts at any point, for this will interfere with the circulation by cutting off the blood supply, and if the bandage is left in place for some time even so severe an injury as mortification or actual death of the part may be caused.

Any bandage may be fastened by a knot or be pinned or sewed. If a pin is used, a safety-pin is preferred, as it holds better and one

is less likely to be scratched by it than by the pin with unprotected point.

The reef knot, as it is secure, should always be employed in place of the granny knot. To tie the reef knot proceed as follows: Hold the ends of the bandage in the two hands; wind the end held

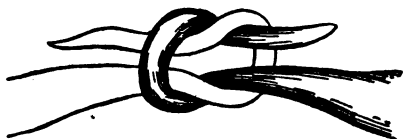


FIG. 6.—Reef knot. (Davis.)

in the right hand over that held in the left; then wind the end now held in the left hand over that held in the right and bring it through the loop. When a choice is given, the knot should be placed where it causes no discomfort to the patient and where it may be easily reached.



FIG. 7.—Reef knot. (Davis.)

The kinds of bandages used are:

The triangular bandage.

The roller bandage.

Special bandages.

**Triangular Bandage.**—The triangular bandage is perhaps best suited for general first-aid work, as it can be easily made, is not difficult to apply as a temporary dressing and is not likely to

be put on so tightly that it will cause injury by stopping the circulation.

The triangular bandage is preferably made from unbleached cotton cloth, though any strong cloth will answer. Bed sheets, pillow cases, napkins and handkerchiefs are all used in case of emergency. It is desirable that the piece of cloth for the bandage be not less than 34 to 38 inches square. It is folded diagonally and is cut across in the fold; of course this

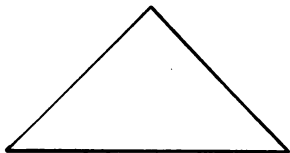


FIG. 8.—Triangular bandage.

will give two triangular bandages. While made triangular bandages may be readily bought, the only advantage they possess is that most of them have illustrations showing methods of application stamped upon them.

The triangular bandage may be applied in two ways:

Unfolded.

Folded.

Unfolded means that the bandage is used in the form of the whole triangle.

To fold, the point of the triangle is brought to the middle of the opposite side, and then the bandage is folded into three, lengthwise.

It is, of course, necessary to determine in each case of injury in what special way the triangular bandage will be used and persons expert in its use are very skillful in adapting it to special cases. Certain set methods have, however, been found by experience to be the most generally useful, and these will now be described.



FIG. 9.—Brachio-cervical triangle.  
(Esmarch and Kowalsig.)

The most important uses of the unfolded triangular bandage are the following:

**1. Arm sling.**

Place one end of bandage over shoulder of uninjured side. Allow length of bandage to hang down in front of chest so that point of triangle will be behind elbow of injured arm. Bend elbow of injured arm to a right angle. This will bring forearm across middle of bandage. Then carry lower end of the bandage over the shoulder of the injured side and tie to the upper end behind the neck. Bring the point of the bandage at the elbow forward to the front and pin there so that bandage is snug but does not pull. (Fig. 9.)

This makes an excellent arm sling, but even without a bandage a good sling may be made for the arm by pinning the sleeve or the skirt of the coat to the front of the coat. The shirt may be used in the same way. (Fig. 10.)

**2. Foot bandage.**

Spread out bandage. Place foot in centre with toes toward point. Raise point over toes to instep in front. Bring both ends forward, cross them over instep and tie them round the ankle. (Fig. 11.)

This bandage has but a limited range of usefulness.



FIG. 10.—Arm sling from shirt sleeve.

### 3. Hand Bandage.

This is applied exactly like the foot bandage. The bandage is spread out. The hand is placed on it, palm down, with the fingers toward the point (if desired, the hand may be closed), and the wrist is at the long side. The point is then brought over the back of the hand to the back of the wrist and the two ends are crossed over the wrist and tied.

This bandage will be found useful more often than the preceding one.

### 4. Head Bandage.

First, fold a hem about one and one-half inches wide at the long side of the unfolded triangular bandage. Place the bandage so that the hem lies squarely across the forehead just above the eyes and the bandage is over the head with the point hanging down the back. Carry the two ends around the head above the ears, cross at the back and tie them across the forehead. Draw the point down tight, turn it up and pin it at the top of the head with a safety-pin. (Fig. 12.)

FIG. 11.—Triangular bandage for foot.

This is a useful bandage. The triangular bandage, folded, is sometimes called the cravat bandage, and in practice by folding the cravat is made wider or narrower as required. As may readily be seen, a cravat may be made of use in any part of the body. It is especially useful to hold splints, dressings, etc., in place, and to check bleeding when applied snugly so as to compress the bleeding point. The following are good examples of the use of the folded triangular bandage, or cravat.

#### 1. Eye Bandage.

Place the centre of the cravat over the injured eye, bring the ends to the back of the head and tie. (Fig. 13.)



## 2. Jaw Bandage.

For this, two cravats are necessary. Apply the centre of the first across the chin in front, bring the ends to the back of the neck and tie. Place the centre of the second cravat under the chin, cross the ends over the top of the head, bring them down and tie under the chin.

## 3. Neck Bandage.

The centre of the cravat is placed over the injured place and the ends are carried around the neck and tied as convenient. This

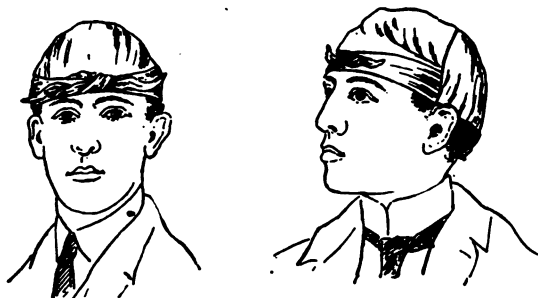


FIG. 12.—Triangular bandage applied to head.

bandage may sometimes be improved by the use of a cardboard support which is held firmly in place between the layers of the bandage.

## 4. Bandage for Palm of Hand.

Place the centre of the cravat on the palm of the hand, cross the ends at the back of the hand and again at the front of the wrist and tie at the back of the wrist. (Fig. 14.)

The cravat may also be used for an arm sling. For this purpose it is employed in the form of a loop which encircles the forearm

bent at a right angle and the neck. When the cravat is used to hold splints or dressings in place on an extremity it is simply carried around the splint, or dressing, and the limb, and is tied at the most suitable point. Of course, the number of cravats employed for this purpose is dependent on the size of the special splint or dressing.



FIG. 13.—Eye bandage.

**The Roller Bandage.**—The roller bandage may be used for any of the purposes already described, though as sometimes employed by the surgeon it is rather too complicated for the student of first aid. Lengths cut from the roller bandage may, of course, be used to replace the folded triangular bandage, and for the unskilled this method of application is always to be preferred to that usually

employed by the surgeon, which consists of winding the roller around and around the part which it is desired to cover. This method of application makes the roller bandage especially valuable in maintaining pressure so as to stop capillary bleeding, to fix dressings after operation, etc. These are not, however, questions which often confront a student of first aid, so if they were the only ones the use of the roller bandage might be wholly disregarded here.

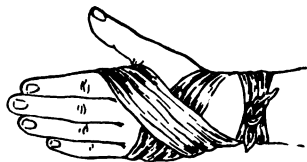


FIG. 14.—Cravat for palm of hand.

But this is not the case. The first-aid student should know how to take advantage of any appliances he may have at hand and he is very likely in an accident to find it much more convenient to

obtain the roller bandage, so for this reason he should know the principles of its application.

Roller bandages are usually made of muslin, cotton cloth, flannel, gauze or cheese cloth, and they may be improvised by tearing strips from a sheet and rolling them up. By far the best material is gauze or cheese cloth. This is elastic and adapts itself well to the part to be bandaged so that it is easy to apply and does not have the disadvantages of the old inelastic bandages of muslin, etc., which in unskilled hands are very apt either to be

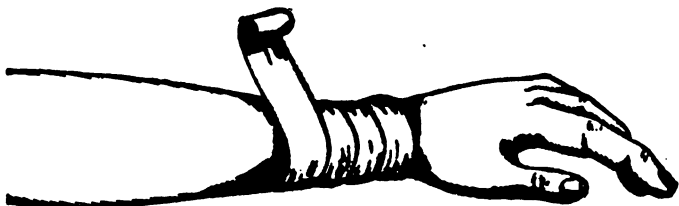


FIG. 15.—The circular. (Davis.)

pulled so tight on one edge that they cut off the circulation or to be so loose that they will not stay in place.

While roller bandages may usually be readily bought, it is well to know how they should be rolled. One end of the bandage should be turned over for a distance of about 6 inches, this lap should be folded on itself and this process should be repeated till a small hard roll is formed. Then place the bandage on the thigh (the foot should be on a stool or chair so that the thigh is nearly at right angles to the body) with roll of bandage near the body, length of bandage at bottom of roll and bandage extending down the thigh. Roll, beginning with the fingers of right hand running down to the wrist, and repeat till bandage is completely rolled. The left hand is used to hold the bandage tight and even. The



bandage when completed should be in a hard roll with even edges. It may be fastened with a couple of pins.

Roller bandages are preferably used in the following sizes:

For the finger,  $\frac{3}{4}$  of an inch wide and 1 yard long.

For the arm and head,  $2\frac{1}{2}$  inches wide and 4 to 6 yards long.

For the leg and thigh, 3 inches wide and 6 to 8 yards long.

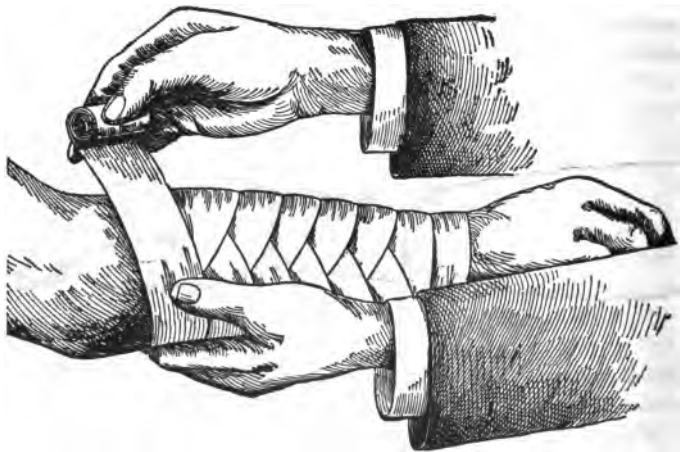


FIG. 16.—The reverse. Preparing to reverse. (Davis.)

For the chest and abdomen, 4 to 5 inches wide and 8 to 12 yards long.

The bandage  $2\frac{1}{2}$  inches wide and 4 to 6 yards long is the most generally used.

While it is not, of course, absolutely necessary to use the bandage best adapted in size for the part to which it is to be applied, it should be remembered that it is very difficult to bandage satisfactorily a small part with a wide bandage. Any bandage when rolled may

be easily cut through with a sharp knife and thus a bandage of the required size may always be obtained.

The roller bandage is applied by holding the roll in the right hand, the loose end being in the left, and laying the outer side of the end on the place where it is desired to start the bandage.

The simplest method of application is the Circular, but this can be used only when the part to be bandaged is of nearly the same

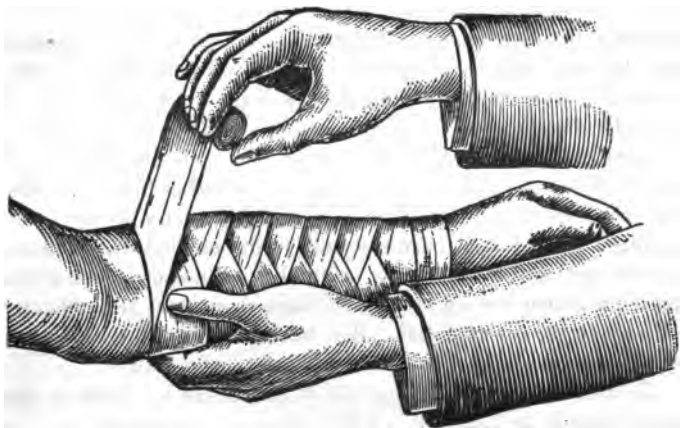


FIG. 17.—The reverse. The roller reversed. (Davis.)

circumference throughout. This is the case with the forearm above the wrist and with the fingers. Moreover, in first-aid work the roller bandage is usually applied to hold splints or dressings in place which much extends the field of the circular method of application as, especially with splints, an even circumference is likely to be presented. The circular method is also more often available with gauze bandages for on account of their elasticity they adapt

themselves to slight pulling much better than do bandages made of stiffer cloth. The circular method of application consists simply of a series of circular turns from below upward, each turn overlapping the upper third of the one below.

Where the part is larger at one end than the other, at the start a few turns should be made round and round one over the other, then begin to move up the limb, using the circular method as long as a turn overlaps the preceding one about one-third. It will be found as soon as the limb increases notably in size that if the bandage lies flat, spaces will be left. To prevent these spaces the Reverse must be employed. The Reverse is generally considered to be the most difficult point to learn in the application of the roller bandage. This is not quite the case, however. While it is certainly much more difficult to bandage successfully a part larger at one end than the other, this is due rather to the fact that one not experienced in bandaging is likely to try to force the bandage instead of at once resorting to the method which allows it to lie flat, and thus to make unsightly and insecure loops at the back where they are not immediately seen than to any real difficulty in making the reverse itself. Bad bandaging in this as well as in other respects can only be avoided by practice and care.

To make the Reverse, place the thumb of the left hand on the lower edge of the bandage to hold it in place, slacken the bandage between the hands (about 3 inches) and turn the roller one half over toward you. Pass the roller under the limb keeping the lower edge of the bandage parallel with that of the turn below, reverse again at the proper point and so on. The reverses should be made so they lie in the center of the limb or to its outer side and all reverses should be in one line up the limb.

*The figure-of-8 bandage* is found specially useful about joints. It consists of a series of loops each overlapping the one below by about two-thirds the width of the bandage. (The middle part

is over the bend of the joint while the loops lie one below the other above it. (Fig. 18.)

The *spica bandage* is a modification of the figure-8 bandage, having one loop much larger than the other.

### Precautions.

In addition to those already mentioned, some other precautions must be observed in the application of the roller bandage:



FIG. 18.—Figure-of-8 of foot. (Heath.)

Always bandage from below upward and always bandage from within outward, over the front of a limb.

Always bandage firmly, but never too tightly or loosely, and use firm, equal pressure throughout the bandage.

Always in bandaging a limb, leave the tips of the fingers or of the toes uncovered so that they may be seen. If the tips of the fingers or toes become blue and cold or if great pain is complained of it is

almost certain that the bandage has cut off the circulation and it must be loosened or dangerous results may follow.

Never reverse the bandage over a sharp bone and always use the figure of 8 over a joint.

Always place the part to be bandaged in the position in which it is intended to leave it, as otherwise change of position may result in cutting off the circulation by drawing the bandage too tight at some point.

Never put on a bandage under, but always over a splint.

Always in applying a bandage immediately after an injury remember that there may be swelling and use care in order that the bandage may not become too tight from this cause; always be ready to remove or to loosen a bandage when such swelling makes it too tight.

Never apply a bandage wet, for as it dries it will shrink and become too tight.

A very valuable exercise in the application of the roller bandage is afforded in bandaging the leg from the foot to include the hip. This gives an opportunity to practice all the methods of application which have been described.

The fact that lengths cut from the roller bandage prove useful in the hands of those unskilled in bandaging has already been mentioned. There are, however, three special bandages made in this way which are so simple and well suited to their special purposes that they should be known to anyone interested in bandaging.

1. **The Arm Sling** will be first described. For this a 3- or 4-inch roller bandage is required, preferably the latter. Bend the forearm on the arm at the angle at which it is desired to hold it, this is usually about a right angle. Put the end of the roller about midway between the forearm and shoulder and hold for a moment to

get length required when it may be allowed to drop. But before doing so pass roller in front and under forearm just in front of the elbow. Then carry roller along front of chest to the shoulder on the injured side, over this shoulder to back of neck, in front of sound shoulder, down to make loop for hand, back over sound shoulder, back of neck and in front of shoulder of injured side to starting point where length required will be cut off and the ends will be tied together. Two loops have, of course, been made, one for the forearm near the elbow and the other for the hand. (Fig. 19.)

2. **The Four-tailed Bandage** is the second of these bandages. This is especially useful for fractures of the lower jaw and for injuries of the head. The 4-inch roller bandage is wide enough to make it for the former. It should be folded lengthwise in the centre and cut or torn in the fold so as to leave 2 or 3 inches in the middle of the bandage which, in applying the bandage, is placed over the chin. The lower ends are then carried up over the top of the head and tied there while the upper tails carried back are tied at the back of the neck. For injuries of the top of the head the four-tailed bandage made in this way from the 4-inch roller bandage will usually be found too narrow. It may, however, sometimes be used, especially if more space is left in the middle, or it may be made from two lengths of the 4-inch roller by sewing or even by pinning them together with safety-pins for the required distance in the middle. When available, a piece of cloth from



Fig. 19.—Arm sling.

6 to 8 inches wide and 3 feet long should be used for this bandage. To apply it the middle of the bandage is placed on the top of the head, the two front ends are carried back and tied at the back of the neck and the two rear ends are carried forward and tied under the chin.

3. **The T Bandage** is the last of these bandages which demands our attention. It is used only for the crotch, especially to hold dressings on that part of the body. It is made from two lengths of a 3-inch roller bandage. To the centre of one of these,  $1\frac{1}{2}$  yards long, is sewed or pinned at right angles the other, which is 1 yard long. The bandage is applied by placing the long strip around the waist with the short one at the middle of the back. The long strip is then pinned in front and the short strip is brought forward between the legs to join the long one at the centre in front where it is pinned.



FIG. 20.—Four-tailed bandage of head. (Stewart.)

**Special Bandages.**—The only special bandage which need be mentioned here, is the one supplied in the first-aid outfit of the American Red Cross. In each of these packets is found a long gauze bandage with a compress of gauze sewn to it in the centre, a triangular bandage printed so as to show how to apply it, and two safety-pins.

The directions, which are also found inside the metal case, are as follows:

**Gauze Bandage with Compress.**—If there is a wound or any injury in which the skin is broken, this bandage and compress are used by unfolding the bandage, **being careful not to touch the inner surface of the compress.** The compress should then be placed directly on the wound or injury, and held in place by wrapping the bandage around the limb in opposite directions and

tying it or pinning it in place. With a very large wound which the compress will not cover, apply it to the middle of the wound and wrap the bandage around as before. In this case be careful not to touch any surface of the bandage which is placed on the wound. In case there is no wound, this bandage may be used like an ordinary bandage to hold splints in place, etc.



FIG. 21.—Red Cross first-aid outfit.

*Triangular Bandage.*—The triangular bandage may be used as an outer bandage or as a sling in the manner pictured on it. This bandage should also be tied or pinned in place.

Do not touch an open wound with the fingers, water, or anything except the compress, or when very large the untouched surface of the bandage.

The pressure of the bandage will stop ordinary bleeding.

The advantages of this outfit are that the contents will always be clean and ready for use, the dressing can be easily applied, and not only does it contain a dressing, but also a sling. With



and material for splints which may usually be easily found one is ready for any ordinary injury.

### COMPRESSES.

Compresses have already been spoken of in connection with the Red Cross first-aid outfit. A compress is simply something which is used to press on or, in other words, to cover an open wound.



FIG. 22.—Red Cross first-aid outfit—showing contents.

It should always be sufficient in size to do so with a lap of at least  $1\frac{1}{2}$  inches on all sides. Compresses should preferably be made of gauze or cheese cloth.

Above everything else they should be safe to apply to wounds. That is to say, they must have been properly disinfected in the first place, and in the second they must not be contaminated by the



FIG. 23.—How to apply Red Cross compress.

fingers or anything else in the handling necessary to apply them. (See Germs.) This is the great advantage of the Red Cross first-aid outfit, which is so prepared by the manufacturers that it is safe to put in direct contact with a wound and is then protected from accidental contamination by being enclosed in a sealed metal box. Moreover, the compress is so attached to its bandage that only gross carelessness in applying it will contaminate it then. A number of other first-aid packets are on the market which contain compresses that may be safely applied to a wound, though none is quite so easy to handle without accidental contamination as the Red Cross outfit. Each has printed directions on the box or container which must be carefully followed. If a first-aid packet can be procured it should always be used in preference to anything else to dress a wound. The next choice should be sterile or antiseptic gauze. Small packages of such gauze suitable for compresses may be bought in most drug stores, and are found in emergency cases. (Sterile gauze is ordinary gauze in which the germs have been destroyed by heat, and antiseptic gauze is ordinary gauze in which germs have been destroyed by an antiseptic, usually bichloride of mercury.) In a city, therefore, or if an emergency case is available, one may easily procure a safe compress and all he need do is to handle it so that he will not contaminate it. This may be accomplished by holding it not with the fingers, but by the paper which covers it, allowing only the inner surface of this paper to come in contact with the gauze and never removing part of the paper until it has served this purpose. If, by chance, the gauze is touched by the hand great care should be taken to drop the untouched part on the wound and to place the gauze which has come in contact with the hand as near the outer layer of the dressing as possible.

As discussed under the heading Germs, unless a safe gauze can be procured it is much safer to leave a wound exposed



FIG. 24.—How not to apply Red Cross compress.

to the air than to cover it, but this will not always prove practicable. It is especially in localities where no gauze can be procured that circumstances render it necessary to cover wounds. In such localities it may be hours before the services of a doctor can be procured, so an uncovered wound will be exposed for a long time to accidental contamination, which will be almost inevitable from the hands or clothing of the patient who must perhaps be moved. A compress, too, affords an excellent means of checking bleeding, being often all that is required for this purpose. Under such circumstances, therefore, it will be necessary to make a compress which, if not as safe as is desirable, is, at least, as good as can be procured. First, as surgically clean cloth for the compress as can be obtained should be used. This will be found in a towel, a handkerchief or other cloth of the same kind which has recently been laundered and has not been used since it was washed. Preferably, this cloth should be boiled for ten minutes or soaked in a solution of 1-1000 bichloride of mercury, corrosive sublimate, for an equal length of time. (Tablets of corrosive sublimate are in common use; they are known as antiseptic tablets. This substance is a deadly poison and its solution cannot be made in metal vessels.) The process recommended will give a compress which is safe to use, but an important practical difficulty is presented in applying such a compress to a wound. It will, of course, be so wet that it will not be possible to put it on the wound without squeezing some of the water out of it. To do this the compress must necessarily be handled and, as will be explained, pus germs exist in countless millions on the hands. If possible, therefore, the hands must be cleaned surgically, which means they should be freed of germs. This should be done by active scrubbing for five minutes with hot water, soap and a nail-brush, paying special attention to the nails. Preferably the hands should be washed under a tap instead of in a basin, and if a basin is used the water had best be changed two or three times. As a further

precaution, when corrosive sublimate is procurable, the hands after being washed should be soaked in a 1-1000 solution of that chemical for a period of five minutes. The hands must not be wiped and they must not touch anything except the compress. The piece of cloth which is intended for a compress may now be taken from the vessel in which it has been boiled or disinfected, but in so doing the operator should be very careful not to allow his hands to come in contact with that part of the compress which he intends to put on the wound. On the contrary, he should pick up the piece of cloth by its outer surface and, holding it at all times by this, squeeze the water from it until it is comparatively dry and then put it on the wound without delay. If a fairly large piece is taken for the compress and if, previous to boiling, or disinfection, it is folded so as to fit the wound it will be handled much more easily and safely.

When no facilities are available for washing and disinfecting the hands, naturally this must be omitted, but the same precautions should be taken in handling the compress. Suppose, however, that in addition the compress cannot be boiled or disinfected, and yet it is absolutely necessary to have one. In this case one should again take a towel, handkerchief, etc., which has just been laundered, and without unnecessary handling apply its inner surface to the wound. Towels, handkerchiefs, etc., which have been used or handled, though they may look clean, are never so in the surgical sense and are therefore particularly dangerous to use as compresses.

No attempt should be made to wash or to disinfect a wound. These are matters for the surgeon, and for him only in favorable surroundings and conditions. It is as unjustifiable for a student of first aid to wash or to attempt to disinfect a wound as it would be to probe it. If he leaves the wound undisturbed and untouched except with the safest compress that can be procured, he will have done his best and the patient should be greatly his debtor.

If he goes further than this he may be solely responsible for much unnecessary suffering and perhaps even for an unnecessary death.

## PLASTER, COLLODION AND SIMILAR SUBSTANCES.

These, of course, seal wounds on which they are used, so that if any pus germs have been introduced they are in the most favorable condition for doing harm. The use of plaster (except court plaster, to cover a trivial scrape not involving the entire thickness of the skin) must be absolutely condemned, for not only does plaster seal the wound, but it is also very likely not to be surgically clean.

Collodion is not surgically dirty, like plaster, and the ether which it contains has some antiseptic properties, so it is not really as dangerous as plaster. But it also may seal up germs under it. A good rule to adopt is to use it only on slight, cleanly cut wounds made by sharp instruments, and to have it removed by a surgeon if inflammation occurs.

## SPLINTS.

Splints are used to prevent movement at the point where a bone is broken. They must, therefore, be made of a stiff and rigid material. For first-aid purposes splints must generally be improvised from something which may easily be procured on the spot. Such articles are pieces of wood, broom handles, lathes, rules, squares, wire netting, heavy cardboard, umbrellas, canes, pick handles, spades, rolls made of blankets or cloth, pillows alone or with pieces of board outside, rifles, swords and bayonets. With a broken leg it is even possible to use the other leg as a splint.

In improvising splints a few precautions should be observed. Besides being rigid enough to prevent movement at the point where a bone is broken, they should be long enough to prevent movement at the nearest joints, as this will move the broken bone and they

should be as wide as the limb to which they are applied, as otherwise the bandages holding them on will press on the limb as well as on the splint and thus cause pain and perhaps displace the ends of the broken bone. On account of the danger from swelling and in order to promote the comfort of the patient and not to rub the skin, splints should be well padded on the inner side with some soft material. The clothing sometimes answers this purpose fairly well when it is not removed. Substances generally used are cotton batting, waste, tow, flannel, pieces of cloth, grass, etc. If splints are not well padded, the limb to which they are applied must be watched with special care because the swelling is likely to make the splints too tight which will cut off the circulation and may cause mortification.

## TOURNIQUETS.

Tourniquets are instruments used to stop bleeding from an artery. Each has a strap to go around the limb, a pad to place on the artery and some means by which the pad may be made to press on the artery and thus stop the flow of blood. In an improvised tourniquet, which is the type most commonly used, the strap may be made of a handkerchief, towel, bandage or cravat, and a smooth round stone, a cork or some object of similar shape and size may be used for the pad. The stone, etc., had best be wrapped in a small piece of cloth so that it will not bruise the skin too much. It is then placed over the artery above the wound and the strap is best passed twice around the limb and tied loosely at its outer side. A stick is introduced between the two layers thus formed and is twisted around until the bleeding is stopped. If desired, another bandage may be used to loop over and to hold the end of the stick from twisting back and so relieving the pressure of the pad on the artery. One layer of bandage may be used for the strap if more is



not procurable. In order to avoid bruising in using this it is best after introducing the stick into the loop to twist away from the body. This is illustrated under the heading Hemorrhage. The

inner tube of a bicycle tire makes an excellent tourniquet. Its end is used for the pad.



FIG. 25.—U. S. Tourniquet.

Besides the bruising of the muscles and skin which is certain to occur to some extent with any tourniquet, there is a much graver danger connected with their use. This is due to the fact that in consequence of cutting off the circulation, mortification and death of the part may follow. If a tourniquet has been in place for an hour, therefore, it is desirable to loosen it and to allow it to remain loose if no bleeding occurs. It should not be removed as it may be necessary to tighten it again quickly should bleeding recommence. Whenever a tourniquet is used, a doctor should be sent for as quickly as possible, for if three or four hours pass with a tourniquet in place, mortification is very liable to follow.

Instead of tourniquets, appliances to make pressure on the whole circumference of a limb and thus to stop bleeding are sometimes employed. The strap which has just been described, without the pad, may be used for this purpose. A special elastic bandage and elastic suspenders have also been recommended. When possible, however, use the tourniquet, as cutting off the whole

circulation by pressure on the entire circumference of a limb is much more likely to cause mortification than the tourniquet, which presses to the greatest extent on the artery alone. If circular constriction is used it should not be employed for over an hour.

### HEAT AND COLD.

Heat employed externally is such a very valuable general stimulant that every first-aid student should know how to make use of it. The ordinary hot-water bag is most convenient for this purpose, but glass bottles and jars are good. They should be covered with cloth or paper to prevent them from burning the patient. Hot bricks and stones are also useful. In using heat in this way it must be remembered that, especially with an unconscious person, there is considerable danger of causing severe burns, so one must make sure by testing the bottle, etc., on his arm or face, that it will not burn even if left in contact with the skin for some time. In applying heat by means of the objects mentioned, to get the greatest effect, they should be placed between the legs, at their outer sides and between the body and the arms. A light hot-water bag lying over the heart acts as a special stimulant to it.

Heat applied locally causes the blood-vessels to enlarge momentarily and then to contract. Every one knows how shrunken the hands look after they have been in hot water for some time. For this reason heat may be used to prevent or to diminish swelling after an injury. Cloths wrung out in very hot water are usually employed for this purpose.

Cold as well as heat is used in first-aid work. It is employed for three important purposes: first, to reduce the temperature of the body in sunstroke; second, to contract the blood-vessels locally and, third, to stimulate the respiration or breathing.

While the full cold or ice bath is the best method of applying cold to reduce the temperature, cold may be utilized for this

purpose by placing bags filled with ice around the body. Sheets wrung out in cold or ice-water wrapped around the patient, may also be used.

Cold may be applied locally to contract the blood-vessels to prevent swelling after an injury. It always seems strange that the two opposites—cold and heat—should have the same effect on the blood-vessels, but this is actually the case. Cold is generally preferred to heat for this purpose, however, at least in all recent cases, such as those which are cared for by first-aid students. Ice bags, cold water running from a tap, cold water in a basin or pail or cloths wrung out in cold water are generally used. Cold metal, such as a wide knife-blade, sometimes proves a convenient means of applying cold especially to prevent black eye.

Everybody knows that on jumping into cold water or on being struck by a stream of cold water he involuntarily takes a deep breath. This effect of cold is taken advantage of to cause breathing to start when it has stopped or to quicken and deepen it if it is slow and shallow. For this purpose cold water should be sprinkled on the face—the front of the body, the chest and the abdomen are also particularly sensitive.

### STIMULANTS.

All stimulants taken internally are best given hot when possible as aside from the particular simulant used, heat itself is a powerful stimulant whether employed internally or externally. Safe and easily procurable stimulants are tea and coffee, a glass of wine, a dessertspoonful of whisky or brandy with an equal quantity of water, or a teaspoonful of pure alcohol with three times the quantity of water (not wood alcohol or denatured alcohol, which are poisons).

Alcohol in some form may usually be easily procured and this use of alcohol is, of course, purely a medicinal one which has nothing to do with the question of the habitual drinking of alcoholic

liquors. But many people object to the use of alcohol under any circumstances, and for other reasons it is not advisable to carry whisky or brandy for first-aid purposes. Aromatic spirits of ammonia which has none of the disadvantages of alcohol fulfils this need better than any other stimulant. It is best given in 20-drop to half-teaspoonful doses in one-third of a glass of hot water.

### EMETICS.

It is necessary to know a few simple and easy methods to cause vomiting.

Running the finger down the throat or drinking a large quantity of warm water are usually effective. A teaspoonful of mustard or salt in a cupful of warm water are household remedies of value and the wine or syrup of ipecac are usually easily procured. The last are given in doses of from one to two teaspoonfuls. An emetic will always work better if the patient drinks something before taking the emetic.

### QUESTIONS.

1. For what purposes are bandages used?
2. What precautions must be taken in applying them?
3. What are the three kinds of bandages?
4. Describe the triangular bandage. Of what is it made? What is its size?
5. What is the unfolded bandage?
6. What is the cravat? •
7. For what purposes can the unfolded bandage be used? The cravat?
8. What are the uses of the roller bandage? From what is it made?
9. What are the sizes used for different parts of the body?
10. What precautions must you take in applying the roller bandage?
11. Describe the Red Cross first-aid outfit.
12. What is a compress?

13. What is necessary in compresses which are to be applied to wounds?
14. What precautions would you take in applying them?
15. How would you go to work to obtain a compress fit for application to a wound?
16. What is taught here in regard to disinfecting a wound?
17. What is a splint?
18. From what materials can a splint be made?
19. What precautions should you always take in applying splints?
20. What is a tourniquet? For what purpose is it used?
21. Describe the strap tourniquet with the pad, and the elastic constrictor.
22. What are the advantages of the former? What are the dangers from tourniquets?
23. How long is it safe to allow a strap tourniquet to remain in place; an elastic constrictor?
24. For what purposes may heat be used by the first-aid student?
25. How would you use heat to prevent swelling after an injury?
26. What are the dangers which may result from heat and how would you prevent them if you used it?
27. What uses can you make of cold and how would you use it?
28. For what purposes would you use stimulants?
29. Name some stimulants you would use and how you would give them.
30. What would you do in order to cause a person to vomit?

### PRACTICAL EXERCISES.

Show a triangular bandage. Show how it is used unfolded and folded. Apply arm sling with bandage and with coat sleeve.  
Foot bandage. Hand bandage; apply with cravat.  
Eye bandage; jaw bandage; neck bandage; bandage for palm of hand. Show roller bandage and apply it to leg and thigh.  
Show arm sling with cravat.  
Four-tailed bandage and "T" bandage.  
Show Red Cross first-aid outfit and illustrate its use.  
Show the method of applying a splint and a tourniquet.

## **CHAPTER III.**

### **GENERAL DIRECTIONS FOR RENDERING FIRST AID. SHOCK.**

#### **General Directions for Rendering First Aid.**

In giving first aid several points must be taken into account. In case of accident when no doctor is present the man trained in first-aid work occupies for the time being the same position as a physician. For this reason in justice to his patient and to himself he must take control of matters. The only persons who should be near a patient are those actually needed to help him. Do not be hurried into moving a patient and always make sure first that he is not going to be injured by being moved. Broken bones must always be secured before a patient is moved.

If the services of a doctor are procurable it is best to send for one at once except for slight injuries.

Moreover, if any doubt exists in regard to the latter point, it is best to send for a physician or to take the patient to a doctor as soon as possible. It should be remembered that injuries and emergencies which are apparently trivial may sometimes, if not treated promptly by a doctor, have serious consequences, and that a physician called in time may with comparative ease prevent conditions which when fully established are beyond the help of medical science.

In approaching the patient do so calmly and without hurry. Be quiet and cool. Generally speaking, the first thing to do for the

patient is to get him into a safe and comfortable position. The best position, unless there is some reason to the contrary, is on the back with the head low. Never raise the head more than necessary to put a small pillow, such as one made of a folded coat, under it. With a flushed face, the head may be raised to this extent; with a pale face, it should not be raised at all. If a person is vomiting, he should be placed on his side or his head should be turned to one side, so that the matter vomited will not go into his wind-pipe and choke him. It should also be remembered that unconscious persons cannot swallow and so they should never be given water, stimulants, etc., as these will choke them by entering the wind-pipe. Slight cases of illness and injury may sit up, but one must be sure that all serious cases are kept in the lying position.

Tight clothing interferes with both breathing and circulation. The collar should be loosened at once and also usually the belt and suspenders.

A hurt person will frequently ask for water, which may be given him with perfect safety. Cold water is usually more refreshing, but whether cold or hot, it must be given fairly slowly so that the patient has time to swallow between sips. Stimulants have already been discussed. To neglect giving a stimulant when it is required would be a grave error of judgment. The first thought with many people, however, is to procure whisky or brandy for every sufferer from illness or injury. These are really as unnecessary for every case as would be the application of splints to the leg of every injured man. They should never be given in injuries of the head, and it should be remembered that while a small quantity of liquor acts as a stimulant, that large ones are depressing.

Whatever the injury may be, it must be seen clearly before any attempt is made to treat it. In order to do this it will generally be necessary to remove some of the clothing. This is likely to be

a very painful and possibly a dangerous process for the patient unless he is handled with the greatest gentleness. In removing clothing, rip up the nearest seam in the outer clothing and cut or tear the underclothing. The sound side should be undressed first so that the injured side will be subjected to less movement. In injuries to the foot and ankle it will rarely be possible to remove the boots or shoes without giving severe pain and perhaps doing considerable damage, so they should be cut freely when this is necessary.

### **Shock.**

More or less shock accompanies all injuries and it must always be thought of and treated when necessary.

#### **Description.**

Shock is a more or less profound depression of the nervous system. It is sometimes called collapse.

#### **Causes.**

Usually a severe injury. Some persons are sensitive to shock, however, and so with them more shock will follow a slight injury than is the case with a severe injury in less sensitive persons.

#### **Prevention.**

The prevention of accidents, especially severe accidents. Also do not allow an injured person to see his own injury, as this is apt to increase shock. This is especially true with severe bleeding.

#### **Symptoms.**

Usually appear immediately after an injury.

Patient is more or less stupid and takes no interest in what is happening near him.

May be partly or totally unconscious or mind may wander.



Face is pale, anxious and pinched; eyelids droop; eyes are dull, with dilated pupils.

Skin is cold.

Breathing is feeble and shallow.

Pulse is rapid and feeble and may not be able to feel at the wrist.

Usually patient gradually improves, in a few hours becoming more like himself, but may not do so, but die of heart failure.

### **Treatment.**

Send for doctor immediately if possible. Combat depression and warm and stimulate in every possible way before arrival of doctor.

First, place patient on back with head low so that plenty of blood will enter brain.

Stimulants should always be given if patient is able to swallow. Hot coffee, hot tea or half a teaspoonful of aromatic spirits of ammonia in a tablespoonful of water. Whisky may be only stimulant procurable. If used, give one large drink only, as more is likely to cause depression.

Ammonia or smelling salts to nose help when procurable.

Never remove more clothing than necessary from an injured person as this will cause more severe shock, and when possible spread coats or blankets over him.

Place hot-water bottles or hot bricks around patient when possible; flannels wrung out in hot water applied to abdomen and chest have the same effect.

Rubbing legs and arms toward body, under blankets, quickens circulation and is useful. Be careful while doing this not to uncover patient.

### **Warning.**

While shock is so extremely common in injuries that it should always be kept in mind and treated, it must not be forgotten that something more dangerous even than shock may require

attention. The symptoms of severe bleeding are very like shock, and if shock only is treated in such a case and the bleeding is not stopped the patient may very readily bleed to death.

### QUESTIONS.

1. Suppose you are called upon to care for an injured person. What would you do first?
2. What about moving an injured person?
3. When should you send for a doctor, or take the injured person to a doctor?
4. In treating an injured person what general measures would you take?
5. What about tight clothing?
6. What do you know about giving injured persons 'water; stimulants?
7. When would you remove some of the clothing and how would you do this?
8. When does shock occur?
9. What is shock? Cause of shock? Prevention? Symptoms? Treatment?
10. Suppose you see a person whom you think is severely shocked, what would you look for in order to determine nothing more severe than shock had occurred?

### PRACTICAL EXERCISES.

The application of all the bandages described in the preceding chapter by the members of the class.

## CHAPTER IV.

### INJURIES IN WHICH THE SKIN IS NOT PIERCED NOR BROKEN.

BRUISES, STRAINS, SPRAINS, DISLOCATIONS AND FRACTURES.

#### Causes.

These injuries are all caused by external violence in the form of blows or falls or by wrenching the body.

This does not apply to all compound fractures, however, as will be seen later.\*

#### Prevention.

Every one is liable to these, the commonest of injuries, and they occur under so many different circumstances that it is impossible to suggest other than the most general means for preventing them. It is safe to say, however, that a great many of them result from carelessness and that especially in dangerous places, people should be more alive to their surroundings. In other words, they should always exercise common care.

Posted directions should always be observed. Such directions are not arbitrary, as they are, unfortunately, sometimes regarded, but represent the teachings of experience.

\* Compound fractures are more conveniently described under fractures, though properly they are injuries in which the skin is pierced and first and foremost require the treatment of such injuries.

## BRUISES.

**Description.**

These are perhaps the most common injuries. When a person falls and strikes some part of his body or when he is struck by something, usually the skin is not broken, but the force of the blow or fall injures the tissues immediately beneath the skin breaking numbers of small blood-vessels therein. Blood escapes from these small vessels and this causes the swelling and the ordinary black-and-blue spot which is due to the blood which has escaped.

**Causes.**

Blows or falls.

**Prevention.**

As given above under general heading.

**Symptoms.**

Pain at once from injury to nerves.

Swelling from escape of blood from vessels.

Black-and-blue spot from same cause.

Pain also later from pressure of this blood on sensitive nerves.

Pain increased by movement.

**Treatment.**

Slight, no treatment.

More severe, object is to limit swelling and to decrease pain.

At once: Ice or very hot or very cold water, or half alcohol and half water. Arnica or witch-hazel. These contract blood-vessels and so prevent escape of more blood and also deaden the nerves to some extent, thus relieving pain. Ice may be applied directly to injured part. Best in using liquid remedy to wet cloth with liquid and then to apply cloth.

Raising bruised part diminishes pain, as it diminishes the blood-supply to the part.

## **56 INJURIES IN WHICH THE SKIN IS NOT PIERCED NOR BROKEN.**

In arm, when severe and movement is painful, use a sling.  
No doctor is usually required for a bruise.

### **Warning.**

A bruise may be only the least important part of an injury. So with a bruise always try to make sure there is no other injury, such as a fracture.

Bruises of the chest and abdomen sometimes result in internal injuries. They may be very dangerous from breaking of the blood-vessels of the lungs, of the abdominal organs, or from actual rupture of the soft internal structures. Severe bruises of this character therefore demand the immediate attention of a physician. In case shock is very severe after a bruise of the abdomen or chest, serious injury of the internal organs should be suspected.

## **STRAINS.**

### **Description.**

A strain is the name given to the injury produced by overstretching of a muscle. In severe strains small blood-vessels in the muscles are often broken so that blood escapes into the muscles in the same way that, with a bruise, blood escapes beneath the skin. The commonest strains are of the muscles of the back and shoulders and of the small tendons of the wrist and ankle.

### **Cause.**

Usually a sudden wrench—may be due to lifting too heavy a weight.

### **Prevention.**

As given above.

**Symptoms.**

Pain increased on movement.

Stiffness.

Lameness.

More or less swelling.

**Treatment.**

Not necessary to call doctor unless severe.

Absolute rest at first.

Alcohol and water, arnica and witch hazel gently rubbed in to deaden pain. Rubbing should always be toward body. Later such rubbing may be harder to help absorption and to make strained muscles more supple. When pain and stiffness have improved, gentle movement until both have entirely disappeared.

**SPRAINS.****Description.**

Sprains are injuries of joints. They result from violent stretching, twisting and partial breaking of the ligaments about a joint and are sometimes accompanied by actual breaking of the bones. The twisting or stretching results in breaking of the blood-vessels and the escape of blood and of blood-serum (the liquid part of the blood) both around and in the joint.

Sprains of the wrist and ankle are most common.

**Cause.**

Unnatural movement of a joint. Sometimes the cause is apparently a slight one, such as twisting the foot in stepping down from a slight elevation.

**Prevention.**

See above under general heading.

### **Symptoms.**

Severe pain immediately.

Pain is much increased by movement of the joint.

Swelling of joint.

Bones are not out of place and there is no deformity other than that due to swelling.

Shock, when severe.

### **Treatment.**

Call doctor always when severe or when in doubt.

Always begin treatment at once whether doctor has been called or not.

Absolute rest in order not to do more damage by rubbing of the injured joint surfaces. This means that the patient should not be allowed to move the joint or to step on it.

Elevate joint when possible and apply heat or cold. Less blood will come to the injured joint if it is elevated and heat or cold contracts the vessels and thus limits the escape of blood and serum. Cold may be applied in the form of snow or crushed ice in a cloth. It is usually better to use cloths wrung out in very hot or very cold water or to shower the joint with very hot or cold water. Putting sprained joint under a cold or hot water tap is also excellent.

Either heat or cold should be made use of sufficiently long to get full benefit from it, that is to say, from 24 to 48 hours. At first on the application of either heat or cold, the pain may increase, but after an hour, at the latest, it will commence to improve and will finally disappear.

Remember there may be shock and, if so, treat.

### **Warning.**

A severe sprain, especially a sprain of the ankle, is by no means a trivial injury but one which demands the services of a physician.

## DISLOCATIONS.

**Description.**

Dislocations are injuries of joints and are due to the head of a bone slipping out of its socket. A dislocation cannot occur, except in a joint which has been dislocated before, without tearing the ligaments which keep the joint close. Some persons, however, on account of frequent dislocations of the same joint have its ligaments so stretched that not only is dislocation easy, but no further injury of the ligaments results from it. By far the most frequent dislocation is that of the shoulder-joint, which occurs in one-half of all cases of dislocation. But dislocations of the hip-joint, the jaw and the fingers are not particularly uncommon.

**Causes.**

Dislocations are usually caused by a blow or a fall, but sometimes result from a violent muscular effect, such as throwing a stone.

**Prevention.**

As given under general heading.

**Symptoms.**

Deformity; that is, the joint has an unusual appearance, because the head of the bone is not in its proper place. This may be best recognized by comparing the injured with the uninjured side of the body.

The limb in which a joint is dislocated may be either longer or shorter than the uninjured limb. This depends on the direction in which the dislocation has taken place. The head of a dislocated bone may often be felt out of its place. Limited movement as the displaced head of the bone is tightly held in its new position.

Pain from pressure of the displaced head of the bone on sensitive nerves.





FIG. 26.—Dislocation and fracture.

Swelling from bruising of the soft parts by the displaced head of the bone.

Shock.

### **Treatment.**

Send for a doctor at once.

Await his arrival except in dislocations of the jaw, the fingers and the shoulder without attempting to reduce dislocation.

Remember that attempts to reduce dislocations, other than those of the finger and jaw, by one not familiar with anatomy may result in great harm to the patient, for the movements necessary to do so may cause serious injury to the blood-vessels, nerves and soft parts.

When no attempt is made to reduce the dislocation, the patient should be put in a comfortable position and the injured joint should be covered with cloths wrung out in very hot or very cold water so as to contract the vessels and to prevent swelling as much as possible.

### **Dislocation of the Lower Jaw.**

This may usually be successfully treated by almost anyone. This is fortunate, as a dislocated jaw with the open mouth in consequence is most painful and uncomfortable. To reduce a dislocation of the jaw, both thumbs must first be wrapped in several layers of cloth so that they will not be liable to injury. Both thumbs are then placed in the patient's mouth resting on his lower teeth on each side while the fingers seize the lower jaw outside. First pressure is made downward and then backward. As soon as the jaw starts into place the thumbs should be slid off the teeth to the inside of the cheeks or they will be caught between the teeth when the jaw springs into place. The overstretched muscles act just like a rubber

band and one must be quick or his thumbs will be injured. When dislocation is reduced put on jaw bandage.

### **Dislocation of the Fingers.**

These, not including those of the second joint of the thumb, present no great difficulties to the first-aid student. The dislocated finger should first be grasped firmly on the hand side. The end of the finger should then be pulled straight out away from the hand and the bone will usually slip into place. No bandage will be required.

### **Dislocation of the Shoulder.**

No attempt should be made to reduce this dislocation if the services of a physician can be obtained within a reasonable time, say four hours. Make your decision on this point at once, for if you are compelled by circumstances to attempt to reduce the dislocation you must get to work immediately before the muscles have become set and rigid from the irritation caused by the displaced head of the bone.

Frequently little difficulty will be experienced in reducing a dislocation of the shoulder, especially if the joint has been dislocated before. To accomplish it, the patient should be made to lie down flat on his back. The person who is going to try to reduce the dislocation should then sit down beside him on the injured side facing toward his head and should place his inner heel, after the shoe has been removed, in the arm-pit of the patient's injured side and then draw down the dislocated arm and drag it toward the uninjured side at the same time pressing outward and upward with the heel. This will usually pry the end of the dislocated bone outward, and as soon as it is free it will snap back into place. In order to

keep the bone in place, the arm should then be bandaged to the side with the forearm carried across the chest and the hand placed on the opposite shoulder.

**Warning.**

In case much difficulty is experienced in reducing any dislocation, do not persist in attempts to do so.

**FRACTURES.****Description.**

When a bone is broken, the injury is called a fracture. Our bones are brittle and when the force used against them is sufficient they break much as would a dry stick. Fractures are among the commonest injuries, ten times as common as dislocations. About two-thirds of all fractures are of the bones of the limbs. Next in frequency are those of the collar-bone and ribs. Fractures of the skull, spine and pelvis are comparatively rare.

A simple fracture is one in which the skin is not pierced.

A compound fracture is one in which the skin is pierced.

**Causes.**

Simple: blows and falls. Compound: also,—from bad handling of simple fractures and from wounds.

**Prevention.**

Simple: as given under general heading. Compound: also,—by proper handling of simple fractures and the prevention of wounds.

**Symptoms. Simple Fracture.**

History of blow or fall.

Pain at point of fracture.

Tenderness at point of fracture.

Person injured is unable to move fractured limb.

Deformity. With a fracture a limb will be altered in shape

and shortened or bent. Always compare with the uninjured side.

Recognition by touch,—an inequality may often be felt by running finger along a broken bone.

Loss of rigidity of bone. On moving a limb in which bone is fractured, instead of the bone being moved as a whole it will be noticed that at the point of fracture there is unusual movement, something like that of a hinge.

Crepitus. This is the surgical term applied to the grating which is heard or felt when the broken ends of the bone are rubbed on each other.

Shock.

### **Warning.**

As one may do great harm by moving a broken bone, for the broken ends are likely to be very sharp, it is much safer when an injured person is unable to move a limb, and from appearances it seems probable that a fracture has occurred, to conclude that it is a fracture without further examination, and to so treat it.

### **Treatment. Simple Fracture.**

Send for a doctor.

The object of treatment before his arrival is to prevent further injury, especially puncture of the skin by the sharp, knife-like edges of the broken bone. If this occurs the simple fracture is, of course, converted into a compound fracture. In the former injury there is no chance of wound infection as the unbroken skin prevents germs from reaching the break in the bone, while in the latter the skin is cut through and in consequence germs reach the broken bone ends and infection occurs. So instead of the few weeks of comparatively painless healing of the simple fracture without much danger, a compound fracture is caused with probable wound infection,

inflammation, pus or matter, and perhaps months of sickness from blood-poisoning, with considerable danger of death. In the treatment of simple fractures the primary object is accomplished by preventing movement of the ends of the broken bone.

If the doctor may be expected to arrive promptly, nothing need be done except to put the patient in a comfortable position. If it is evident that in order to do this the broken bone will be moved, it must be supported firmly by the hands. One hand should support the broken bone on each side of the break. The bone must not bend at the break while the patient changes his position to a more comfortable one. Then the broken bone had best be supported in the natural position on a pillow or a folded coat. In so supporting it great care must be taken that it is not bent or does not drag on the point of fracture.

If the patient must be moved more than slightly, as just described, the broken bone should be set; that is to say, it should be gently drawn into its natural position, always determining this by comparing it with the opposite side, and held there firmly by the application of splints.

If the injured person is wearing thin summer clothing, it will not usually be necessary to remove the clothing in order to examine for fracture. In fact, it will be better not to try to do so, as this may result in injury from moving the sharp ends of the bone, and when the clothing is left on it furnishes excellent padding for splints. With thick clothing, however, very likely one will not be able to tell that a fracture has occurred or what the character of the injury is. In this case never try to take off the clothing, but cut it in the seams with a sharp knife or scissors.

**Treat shock.**

**Symptoms. Compound Fracture.**

Besides the symptoms already described, there is a wound leading down to the broken bone, or the broken end of the bone protrudes through the skin.

**Treatment. Compound Fracture.**

Send for doctor.

Expose fracture by cutting clothing.

Turn back clothing from wound.

Use same precaution as in simple fracture to prevent movement of sharp ends of broken bone.

Do not touch wound with fingers or anything else.

As soon as possible procure an antiseptic or surgically clean compress and place it on the wound.

If sharp bone is buttoned-holed through the skin, as frequently happens, do not attempt to restore it to its place, but by padding splint hold it in position as it is.

Always treat wound first, then fracture.

Treat shock.

**Warning.**

Never in any fracture attempt to transport patient until the broken bone is firmly fixed in position by splints.

**Fracture of Lower Leg.**

**Symptoms.**

As given above. Patient falls to ground. Is not usually difficult to detect fracture.

**Treatment.**

Send for doctor.

Secure pillow, sack stuffed like pillow with hay, straw or the like or a blanket rolled on poles at each side so as to make trough.

Gently lift the leg to pillow, etc., placing one hand above and

the other below break under leg, always holding in natural position.

Leg on pillow, should not allow toe to turn in or out, but



FIG. 27.—The pillow splint. (*Dulles.*)

should be supported in same position as toe of uninjured leg. Nothing further unless must move patient. If this must be done the leg should be drawn into natural position and splinted.



FIG. 28.—Splints for fracture of lower leg.

Use two splints when procurable. Though any stiff material may be used for these splints, preferably they should be of thin boards longer than the leg so as to prevent movement



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at the knee-joint, and wider than the leg is thick. The splints should be applied outside of pillow, one at the inner and the other at outer side of leg. They should be held in place by 3 or 4 strips of cloth, straps or handkerchiefs passed around splints, pillow and leg and tied. Care must be taken that none of these strips is directly over break, as this will cause intense pain by pressure. The pillow alone makes a fairly good support even without splints. Splints also may be used without a pillow. If this is done the clothing, straw, hay, cotton, leaves or something else soft must be used for padding under the splints, which are tied in place in the way described above. In case of emergency anything stiff of sufficient length, such as



FIG. 29.—Splints for fracture of thigh.

a cane, umbrella or the like, may be used for the outer splint, the other leg being used for the inner splint. The strips of cloth or handkerchiefs are then passed around the splint and both legs and tied as before.

Treat shock.

### Fracture of Thigh.

#### Symptoms.

As above, patient falls to ground.

May be difficult to detect fracture on account of thick muscles.

**Treatment.**

The necessity of procuring a physician and of treating shock are greater than in fracture of the leg. Remarks in reference to careful handling of broken bone apply.

If difficult to detect fracture, treat as fracture.

A long splint extending in a solid piece from foot to arm-pit is required for outside splint to prevent movement of hip-joint. This should be firmly fixed by encircling strips of cloth to the chest as well as to the limb.

Inner splint had best extend from crotch to foot. If no inner splint can be obtained, tie legs and thighs together.

**Broken Knee-cap.****Symptoms.**

As above, patient falls to ground and cannot raise leg.

Not difficult to detect fracture, as can feel groove in knee-cap immediately beneath the skin.

**Treatment.**

Services of a physician will be required and shock generally demands treatment. Must also use care in moving leg.

Straighten leg.

Secure splint long enough to extend from middle of thigh to middle of lower leg. Preferably, this should be a thin board as wide as thigh, but a cane, umbrella or the like may be used in case of emergency. Make pad for splint, apply splint to back of thigh and leg with middle opposite bend of knee and tie in place with strips of cloth or handkerchiefs. Be careful not to put bandage over break, but one strip immediately above and one immediately below knee.

### Fracture of Collar-bone.

#### Symptoms.

Patient supports elbow of injured side with hand of other side.

Is unable to raise arm above shoulder.

Is easy to feel depression by running finger over injured collar-bone.

#### Treatment.

Send for doctor.

Make pad from a large handkerchief, two medium-sized handkerchiefs, a triangular bandage or the like.



FIG. 30.—Dressing for fracture of collar-bone.

Place this pad in arm-pit of injured side. Put arm in sling with forearm at right angle to upper arm.

Take a bandage about 3 inches wide, put this horizontally around body and injured arm at elbow. It will, of course, encircle both the elbow, the bent arm and the body. When tied by pulling elbow to body it will force upper end of humerus outward.

Another method:

Have patient lie down and place his injured shoulder on pillow in a comfortable position till doctor arrives.

Treat shock.

### Fracture of Upper Arm and Forearm.

#### Symptoms.

These fractures can almost always be easily detected by the symptoms already given.



FIG. 31.—Fracture of upper arm. (*Drill Regulations, H. C., U. S. A.*)



FIG. 32.—Splint and sling for forearm. (*Drill Regulations, H. C., U. S. A.*)

#### Treatment.

Send for doctor.

Treat shock.

Gently straighten limb so as to put it in natural position.

Secure two splints long enough, in upper arm to extend from shoulder and arm-pit to elbow, and in forearm from elbow to

middle of hand. These are best flat boards, shingles are excellent, but may be of any stiff material, such as twigs, cover of wine bottles, tin trough, etc.

Pad splints well.

In upper arm, if lower part of bone is broken, apply one splint behind and the other in front. If fracture is of middle or upper part, apply one splint to inner and the other to outer side of arm.

Support by sling.

In forearm:

Place forearm across the chest, thumb up.

Apply one padded splint—clothing will do for padding—to outer side from elbow to beyond wrist and the other to inner surface extending to tips of fingers.

Support by sling.

### **Broken Wrist.**

This is an extremely common injury resulting from falls on the hands which are put out in falling forward to protect the body.

#### **Symptoms.**

This belongs to a class of fractures to which the name impacted is given. The force of the injury actually drives one bone into the other so that they are held together.

Great deformity, no crepitas, movement, etc.

#### **Treatment.**

Send for doctor.

Do not attempt to free bones, but leave them as they are.

Otherwise treat like fracture of forearm.

### **Broken Fingers.**

#### **Symptoms.**

Usual symptoms of fracture, which is easily detected.

**Treatment.**

Gently draw into natural position.

Put narrow padded splint under finger and hold it in place with a narrow bandage.

Support hand in sling.

Show to doctor as early as practicable.

**Fracture of Ribs.****Symptoms.**

Sharp pain on taking a long breath or coughing. Breathing is usually short, patient often presses hand to side to prevent movement of chest.

May feel grating of ends of broken bones on each other by placing hand on chest at point where pain is most severe.

**Treatment.**

Tie a large handkerchief or a triangular bandage firmly around the chest, pin a large towel snugly around chest or apply a roller bandage to chest. These limit chest motion and thus diminish pain.

If shock is severe, call doctor immediately. If not, after bandage is in place may visit a doctor as soon as practicable. Treat shock.

**Fracture of Skull.****Symptoms.**

Patient probably unconscious from injury to brain. If at base of skull, there will probably be a discharge of blood from nose, ears or mouth. If at vault, fracture can easily be detected under skin.

**Treatment.**

Send for doctor.

Place in lying-down position with head slightly raised and keep very quiet until doctor arrives.

**Fracture of Lower Jaw.**

**Symptoms.**

Mouth open, patient cannot speak.

Fracture may often be felt outside, and inside there will be an irregularity of the teeth.

May be bleeding from gums.

Shock.

**Treatment.**

Send for doctor.

Gently raise broken jaw and bring lower against upper teeth.

Support in this position with the jaw bandage described on page 25 or with two strips of bandage, one vertical, tied over top of head and the other longer, brought to back of head, crossed and brought horizontally to forehead and tied there.

Treat shock.

**Fracture of Nose.**

**Symptoms.**

Usually not difficult to detect.

Pain, swelling, crepitus and deformity. Swelling may be so great that obscures deformity.

Is not infrequently compound.

**Treatment.**

Put in as natural position as possible and hold there with an adhesive-plaster strip across nose from cheek to cheek.

Before applying plaster, put a small compress of gauze on each side of nose.

If you have no adhesive plaster put on bandage over nose and around head, but do not pull tight enough to flatten nose.

Consult doctor, as there is danger of permanent deformity.

### **Broken Back.**

#### **Symptoms.**

Patient unable to move.

No motion or feeling of body below injury.

#### **Treatment.**

Send for doctor at once. If possible, do not move patient before his arrival.

If patient must be taken from the spot where his injury has occurred, procure ample assistance to lift him. This should be done with the greatest care so as not to bend spine for this will crush spinal cord.

Put stretcher under patient and gently lower him to stretcher.

Treat shock.

### **QUESTIONS.**

1. What are the common causes of injury without a break of the skin?
2. How may such injuries be prevented?
3. Describe bruises.
4. What are the symptoms of bruises?
5. How would you treat them?
6. In a severe bruise what else must you look out for?
7. What is a strain? How is it caused? What are the symptoms?
8. What is the treatment?
9. What is a sprain? How is it caused? Symptoms? Treatment?
10. Is a severe sprain a slight injury?



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11. What is a dislocation?
12. How are dislocations caused? Symptoms? Treatment?
13. Under what circumstances would you be justified in trying to reduce a dislocation?
14. When should you proceed to do so?
15. Danger of attempts to reduce dislocations.
16. Describe special treatment for dislocations of the lower jaw, finger and shoulder.
17. What is a fracture?
18. Are fractures common accidents as compared to dislocations?
19. What is a simple fracture?
20. What is a compound fracture? Causes of simple fractures and compound fractures?
21. How would you prevent a simple fracture from becoming a compound one?
22. How would you recognize a simple fracture in an injured person?
23. How would you treat a simple fracture?
24. How would you recognize a compound fracture?
25. Treatment of compound fracture?
26. Symptoms and treatment of fracture of the lower leg; the thigh; of knee-cap; of collar bone; of upper arm and forearm; of wrist; of fingers; of ribs; of skull; of lower jaw; of nose; of back.

### PRACTICAL EXERCISES.

Show methods of treatment of dislocations of lower jaw, shoulder and fingers.

Show methods of treatment of a simple and of a compound fracture.

Show treatment and application of splints in fracture of lower leg; the thigh; the knee-cap; collar-bone; upper arm and forearm; wrist; fingers; ribs; skull; lower jaw; nose; back.

## CHAPTER V.

### INJURIES IN WHICH THE SKIN IS PIERCED OR BROKEN.

Injuries in which the skin is broken or pierced are commonly called wounds.

**Description.**—In a wound not only is the skin broken or pierced, but there is usually more or less damage to the tissues beneath it. This serves to distinguish wounds from the injuries which have just been described (except compound fractures, which are really wounds) for with the former the injury is confined to the tissues underneath the skin. In wounds, as the protective covering, the skin, is broken through, there is danger of the entrance of pus germs and consequently of inflammation with the formation of matter or pus. In wounds, too, as some blood-vessels must be injured, there is more or less hemorrhage or bleeding.

It is very important for the first-aid student to understand clearly the action of germs which enter the body through a wound. These germs are vital or, in other words, living organisms. While with injuries from mechanical and chemical agencies the damage to the body is done at once at the time the injury is received, with injuries from vital agencies this is not the case. No effect is apparent at the time of the injury, but the damage comes later with the growth of the living organisms.

The germs which we need consider can only enter the body through a wound or a break in the skin. These germs which are too small to be seen except through a powerful microscope cause inflammation and the formation of pus, or matter. They exist

in countless millions, but they do not live in the tissues of our bodies and must, therefore, always enter from outside. This is a most important fact to remember. It is also important to know that pus germs do not float in the air and so cannot be carried to a wound from the air. Pus germs are found on the surface of our bodies, on knives and other objects which cause wounds, in the dust of houses, in water, etc., and also on surgical instruments and dressings unless special means have been taken to free them of germs or, in other words, unless they have been disinfected.

Suppose a wound is received, what happens? If pus germs do not gain entrance to it, there will be no inflammation and it will heal quickly and kindly; but if, on the other hand, the wound is infected by pus germs, this means that inflammation will follow, more or less matter will form, and there will be some absorption of poisonous products from the wound which may result in the more severe forms of blood-poisoning and almost inevitable death. But as pus germs are so generally present, it may appear that under ordinary conditions they would always be carried into a wound when it is received, either from the surface of the body or by the object which causes the wound. This is true, but if only a few pus germs are carried into the tissues they will dispose of the germs without trouble and no harm will result; moreover, unless too many pus germs are carried into the body, the blood resulting from the injury will often wash so many out that the tissues can dispose of the few left with little difficulty. This is exactly the reason why a wound which bleeds freely is less likely to prove dangerous. We may assume, then, that every wound is not contaminated and must use every care not to contaminate it by our hands, by instruments, dressings, etc. This is best accomplished by covering it with a disinfected dressing, as this will prevent contaminated articles from coming in contact with it. (See Compresses, page 36). But if no such dressing is available, it is best,

when possible, to leave it exposed to the air, for, as has been stated, little danger of contamination is to be feared from the air. Ordinary water is dangerous as it may contain many pus germs.

The symptoms of inflammation in a wound are heat, redness, pain, swelling and partial or complete loss of use of the wounded part. If these appear in a wound three or four days after an injury, unless they are slight a doctor is necessary, as they may grow much worse.

### Varieties of Wounds.

1. Cut or incised wounds, in which the skin and underlying tissues are cleanly divided by a sharp instrument. They are caused by razors, sharp knives, glass and the like. To prevent them as with the former class of injuries common care should be exercised. In this variety of wounds, as blood-vessels are cleanly cut across, there is likely to be severe bleeding.

2. Torn or lacerated wounds, in which the tissues are torn rather than cut. They are caused by a tearing or crushing injury, such as the blow of a blunt instrument, by machinery or by being run over or struck by a wagon, trolley or railway car. As a means of prevention, attention need be called only to common care. With them, as the blood-vessels are crushed as well as the other tissues, hemorrhage is not nearly so likely to occur as in the preceding variety, but on account of the character of the injury, dirt is likely to be ground into the tissues and they are so extensively torn and destroyed that infection followed by inflammation and matter or pus is extremely common.

3. Punctured wounds are deep wounds of small calibre produced by sharp-pointed instruments, such as daggers, bayonets and the like. Wounds caused by bullets are also included in this class. Wounds of this variety are, of course, frequently purposely inflicted, but the great majority of bullet wounds in civil life result from

carelessness which is almost, if not quite, criminal. "I didn't know it was loaded" is not sufficient excuse for shooting a fellow-being, and if one observes the rule of never pointing a gun or pistol at himself or at anyone else he will have no occasion to make this excuse. The amount of bleeding in this variety of wounds is often slight, but may be great if a large blood-vessel is injured. Infection is not uncommon, as pus organisms when carried into such wounds have ideal conditions for multiplication.

### **Symptoms of Wounds.**

Presence of the wound.

Pain.

Shock.

Hemorrhage.

**HEMORRHAGE:** Practically all wounds bleed more or less, but comparatively few are accompanied by dangerous hemorrhage, as large blood-vessels usually escape injury. Besides the actual appearance of blood in hemorrhage, the loss of a considerable amount of blood gives rise to certain symptoms: Faintness, with cold skin, pale face, dilated pupils, feeble, irregular breathing, sighing, weak pulse, dizziness and loss of consciousness. The severity of the symptoms depend on how much and how rapidly blood is lost.

### **Treatment of Wounds.**

This had best be considered under two headings:

1. Treatment of wounds without severe hemorrhage, and
  2. Treatment with wound with severe hemorrhage.
1. **Treatment of wounds without severe hemorrhage.**

In deep wounds or those which cover a considerable surface, always send for a doctor at once. It is always better to call in a physician if you doubt your ability or resources.

Cut or rip clothing so as to get a view of the wound.

Turn back the clothing so it does not touch wound.

Do not touch wound yourself nor allow patient to touch it. Remember there is no hurry, for air will not infect the wound. If a physician may be expected to arrive within a few moments, it will usually be necessary to do nothing further.

Exposure to the air is much safer than the application of anything which is not surgically clean or antiseptic. If, however, you have a surgically clean or antiseptic compress—apply it to the wound at once and bandage firmly into place. This will prevent accidental contamination and will usually stop any bleeding there may be. In fact, this procedure will stop hemorrhage in ninety-nine per cent. of all wounds.

Treat shock, if any.

If patient is faint, always have him lie down with his head low. With trivial wounds, such as scratches, it is much better to encourage bleeding than to try to stop it.

Do not suck such wounds, but by pressure at their sides make them bleed. In the fingers this is best done by milking the finger.

Do not wipe off the blood unless you have a surgically clean cloth with which to do so. This is the only class of wounds in which water may be used to wash off the blood. The danger of contaminating these small wounds by water is very slight and the matter washed away by the water is much more dangerous than the water itself.

A piece of clean gauze makes a good dressing.

## **2. Treatment of wounds with severe hemorrhage.**

Check the bleeding.

Put patient in such a position that he will be least affected by the loss of blood. This is lying down with the head low so that the brain will get as much blood as possible. Do nothing which will increase bleeding. Violent movements must be prevented. When once the bleeding has ceased the patient

should remain quiet, as any movement may dislodge the clot and start it again. See that the patient gets plenty of good air, cover him warmly and put hot bottles around him if they can be obtained. Naturally, stimulants increase the force of the heart, so they are undesirable; but sometimes the patient becomes so weak that it is absolutely necessary to give them to prevent him from dying. Whenever possible, always avoid doing so until the bleeding has been checked by some mechanical means. One-half teaspoonful of aromatic spirits of ammonia in a tablespoonful of water or a tablespoonful of whisky are good stimulants.

In order to check the bleeding it is necessary to know from which kind of vessels it comes.

1. Arterial hemorrhage is recognized by bright red blood expelled in jets. The blood is lost very rapidly.
2. Venous hemorrhage is recognized by a steady flow of dark blue blood.
3. Capillary hemorrhage is characterized by the oozing of blood of a brick color.

Hemorrhage will not be severe except from arteries and large veins.

Naturally, as arteries, capillaries and veins may all be cut in a wound, there may be bleeding from all three. In this case arterial hemorrhage demands first consideration, and with venous and capillary hemorrhage the latter may be disregarded for the time being.

### **Arterial Hemorrhage.**

#### **Treatment.**

Send for a doctor at once.

Do not wait for him, for by so doing the patient may die or be in a hopeless condition when he arrives.

If necessary, cut off clothing at once so as to see bleeding point. In very severe hemorrhage proceed with next step before doing this.

Press with your fingers or thumb on the artery between the bleeding point and the heart. This stops the bleeding just as you can check the water flowing from a hose by pressure in any part of its length. It does more than this, however. Nature's method of checking hemorrhage is by the formation of a clot, and as pressure prevents the washing away of the blood beyond the point of pressure an opportunity is given for a clot to form.

The points where pressure can best be made on arteries in their course have already been given, but it will be best to review this subject so far as the principal points where pressure can be most effectively made with the fingers or thumb, etc., are concerned:

The temporal artery which furnishes the most dangerous bleeding in scalp wounds is reached by pressure in front of the ear just above where the lower jaw can be felt working in its socket. A branch of this artery crosses the temple on a line from the upper border of the ear to above the eyebrow. Either of these points can be used for bleeding above on the same side of the head. Bleeding from any part of the scalp may be stopped by a tight bandage around the head. This bandage should encircle the head, going across the forehead just above the ears to the base of the skull behind.

The carotid artery may be compressed by pressing the thumb or fingers deeply into the neck in front of the strongly marked muscle which reaches from the upper part of the breast-bone to behind the ear. Figure 33 shows pressure on the carotid on the left side. All bleeding from the head, except from the side above, which has already been referred to, had



best be checked by pressure on the carotid artery. Wounds of the neck whether from arteries or veins are so immediately and extremely dangerous, however, that direct pressure on the bleeding point should be resorted to at once.

In bleeding from wounds of the shoulder or arm-pit, the subclavian artery may be reached by pressing the thumb deeply into the hollow behind the collar bone. (Fig. 34.) In



FIG. 33.—Pressure on carotid artery. (*Drill Regulations, H. C., U. S. A.*)



FIG. 34.—Pressure on subclavian artery. (*Drill regulations, H. C., U. S. A.*)

bleeding from any part of the arm or hand, the brachial artery should be pressed outward against the bone just behind the inner border of the large muscle of the upper arm. (Fig. 35.) While bleeding in the palm can be checked in this way direct pressure by means of a stone wrapped in gauze or the like firmly bandaged in the palm with the hand closed upon it is much better.

In bleeding from the thigh, leg or foot, press backward with

the thumbs at the middle of the groin where the artery passes over the bone. (Fig. 36.)

In making pressure with the fingers, if you feel the beat of the artery, you can be quite sure that with a little care to get it between your fingers and the hard point you can check the bleeding. If you have stopped the bleeding in the manner just described, you may also be quite sure that the patient is safe so long as you continue the pressure.



FIG. 35.—Pressure on brachial artery. (*Drill regulations, H. C., U. S. A.*)

You will hardly be able to do this for more than ten or fifteen minutes, however, as your fingers will become tired and cramped. It will be best, therefore, in wounds of the extremities to have a tourniquet made to place around the limb against your fingers with the pad on the artery; the tourniquet then to be twisted. Tourniquets are described on page 43. Another method which gives the same results as a tourniquet may be used in bleeding below the knee or elbow. In either a good-sized pad made of gauze or a

roll of cloth should be put in the bend of the joint and the joint bent together and tied in this position with a bandage or a strip of cloth so that the pad makes pressure on the artery in the joint angle.

One of these methods will usually be all that is necessary if the services of a doctor can be produced within two or three



FIG. 36.—Pressure on Femoral Artery.

hours. If this is not the case you will be in a serious position. If either apparatus is left in place much longer than this there is considerable danger from cutting off the blood-supply that you will cause the death of the part below. No part of the body can do without blood for a long period; and yet if the pressure is removed the bleeding may recommence. Under



**FIG. 37.—Tourniquet Applied to Brachial Artery.**

such circumstances, therefore, leave the tourniquet or pad in position as long as you dare, say two hours. In the meantime procure an antiseptic compress or have one prepared in the manner already described. Place this gently on the wound and bandage firmly in place so as to make strong pressure on the



FIG. 38.—Tourniquet Applied to Femoral Artery.

bleeding point. The pressure between the heart and the wound may now be gradually released. If the bleeding does not recommence, well and good; if it does, the tourniquet or pad must be reapplied. Another attempt to remove it should not be made for at least an hour, as time is needed for the clot to reform.

Suppose, at first, and this is by no means improbable, that

you have failed to stop the bleeding by pressure between the heart and the bleeding point—there is still no reason why you should become panicstricken. Of course you do not want to put your fingers in the wound as this will be very likely to infect it, but in case of a severe arterial hemorrhage which you are unable to check by pressure between the heart and the bleeding point you must at once make pressure on the cut artery in the wound. If you have an antiseptic compress or a surgically clean cloth to put over your fingers, which are used to make direct pressure, so much the better, as this will prevent infection; but do not wait to obtain it. When direct pressure is made in this way, it should be replaced, if possible, by a compress bandaged in place in the manner which has already been described.

With wounds of the smaller arteries if a compress is firmly bandaged in the wound at the beginning it will often be all that is required to check bleeding. Position is also of value in stopping such hemorrhage. By elevating the arm or leg the heart is made to pump against gravity and a much better chance is given for a clot to form, which will block the injured artery.

### **Venous Hemorrhage.**

(Large Veins.)

#### **Treatment.**

Stopping bleeding of this character is rather simple as compared with checking arterial hemorrhage.

Send for a doctor.

Remove any bands, such as tight collars, belts, garters and clothing which prevent the return flow of blood to the heart.

If a limb be wounded, elevate it so as to assist the flow of blood back to the heart.

Apply a compress directly to wound and bandage on tightly. If no compress can be obtained which is surgically clean or antiseptic, if bleeding is very severe it will be necessary to make direct pressure in the wound with the fingers.

This will, of course, be done at the risk of infecting the wound. If possible, keep wounded part in an elevated position for some hours after bleeding has stopped.

With wounds of the neck, such as those caused in an attempt to cut the throat, some of the jugular veins are often divided. It is quite probable in such a case that death will occur before anything can be done. If not, jam the fingers on the bleeding point at once and replace them with a compress at your leisure. This compress should be bandaged tightly in place.

Varicose Veins are veins which have become very large from weakening of their walls. Only those of the legs need be considered here. They may burst from injury or without an injury, causing serious or even fatal hemorrhage if they are not given prompt attention.

Send for a doctor at once.

Put patient on his back.

Remove all bands around leg above bleeding point.

Raise leg.

Cut and rip clothing so as to get at bleeding point. Turn back clothing from wound.

Place surgically clean or antiseptic compress on bleeding point and bandage firmly in position, or when absolutely necessary use fingers first for direct pressure on the bleeding point and replace them by a clean compress. Keep patient lying down for some hours with the leg elevated.

If there has been considerable loss of blood, cover patient warmly and place hot bottles around him. Give stimulants

only when absolutely necessary to prevent death, as they will increase the force of the heart and so the bleeding.

### **Internal Hemorrhage.**

May result either from a deep wound which cuts a large blood-vessel of one of the internal organs or from the bursting of a blood-vessel of the lungs or stomach.

#### **Symptoms.**

Those of hemorrhage, but as the bleeding is internal it will not be seen.

#### **Treatment.**

Send for a doctor at once.

Put patient in a lying-down position immediately, with his head lower than his body.

Apply ice or cloths wrung out in very cold water to the point from which you think the bleeding comes. To distinguish between bleeding from the lungs and stomach, remember that from the former the blood is bright red and frothy and is coughed up, while from the latter it is dark and is vomited.

Give stimulants only when patient is becoming very weak.

### **Nose-bleed.**

Usually this does not result from a wound, but comes on spontaneously. Slight nose-bleed does not require treatment, as no harm will result from it.

#### **Treatment.—Severe.**

Place patient in a chair with his head hanging backward.

Loosen collar and anything tight around the neck.

Apply cold to the back of the neck by means of a key or of a cloth wrung out in cold water.



Put a roll of paper under the upper lip between it and the gum. If bleeding does not cease, salt and water, a teaspoonful of salt or vinegar to a cupful of water, should be snuffed up the nose.

If bleeding still continues, send for a doctor to come at once. Before his arrival place a small piece of cotton or gauze in the nostril from which the blood comes and shove it in gently for about 1 inch. A pencil answers very well to push this plug in.

Pinching the soft part of the nose below the bone will also help to stop bleeding.

Stimulants should be used only as in the other classes of hemorrhage.

### **Abdominal Wounds.**

All wounds should be treated on the general principles already described. A word or two is required, however, on the subject of Abdominal Wounds in which more or less of the abdominal contents escape through a large cut.

Send for a doctor at once.

Place a clean cloth over the wound and keep it constantly wet with a weak solution of salt and water, for if these delicate structures become dry they will suffer almost fatal damage from this cause alone.

Treat shock.

### **Wounds in Which Foreign Bodies Remain.**

#### **Treatment.**

Such bodies should be gently pulled from the wound in a direction contrary to that in which they entered.

If they are of considerable size and have damaged the tissues

a good deal, the wound should be shown to a doctor at the earliest opportunity.

With a splinter of wood, the commonest of such foreign bodies: Pull the splinter from the wound with a pair of pincers or by putting a knife blade against it and holding it on the blade with the thumb-nail.

The same method may be used with a splinter under the nail. But if it is broken under the nail, scrape the nail thin over it and cut out a small V-shaped piece so as to reach it.

Small splinters in the skin may be removed by a needle.

In order to avoid possible infection it will be much safer to wash the skin with hot water and soap and to pass the needle through a flame before using it.

A wound from which a foreign body has been removed should never be sealed with plaster or collodion.

### Eye Wounds.

As previously stated, the eyeball is fairly well protected from injury, but such injuries do occasionally occur. The symptoms are severe pain and redness of the eye, and if a wound has been inflicted it is usually easy to see the cut. Such injuries should be treated by a doctor. Therefore, in any injury of the eyeball, cover both eyes with absorbent cotton or soft cloths soaked in cool water so as to keep the eyelids still, and bandage them into place with bandages around the head. Be careful not to put on these bandages so tightly that they will press on the eyeballs, and in order to prevent inflammation keep them constantly wet with cool water until the services of a doctor can be procured. While boiled water is safer for this purpose there is little danger in the use of any clean water.

Splinters in the eye should be pulled out if possible. If they cannot be removed, put a few drops of olive or castor oil in the eye.

Whether removed or not, the eyes should be treated in the manner just described and a doctor should be consulted as soon as possible.

Foreign bodies in the eye are usually cinders, sand or particles of dust. They cause a great deal of discomfort and pain, and tears, which, fortunately, often wash them out.

Never rub the eye, as this will be likely to rub the foreign body into its delicate covering.

First, close the eye so that the tears will accumulate and the foreign body will frequently be washed out or into view, so that it may be easily removed. If this fails, pull the upper lid over the lower two or three times, close the nostril on the opposite side with the finger and have the patient blow his nose hard.

If the foreign body still remains in the eye, examine first under the lower, then under the upper lid. For the former, have the patient look up, press the lower lid down and if the foreign body is seen brush it off with the corner of a clean handkerchief. The upper lid is not so easy to see. Seat patient in a chair with his head bent backward. Stand behind him and place a match across the upper lid one-half inch from its edge. Turn the upper lid up and back over the match and brush off the foreign body as before. A few drops of castor oil in the eye after removing a foreign body will soothe it.

Lime in the eye may be neutralized by bathing it with a solution of vinegar, a teaspoonful to a cupful of water. Particles of lime large enough to be seen should be removed like other foreign bodies.

### QUESTIONS.

1. What is a wound?
2. What is the special danger to be feared in a wound?
3. What are the vital agencies?
4. What is the difference in the effect produced by a mechanical or chemical, and a vital agency?
5. How can a germ enter the body?

6. Where are the germs found?
7. What does disinfection mean?
8. What happens in a wound if germs gain entrance to it? If they do not gain entrance to it?
9. How does free bleeding diminish the danger of wound infection?
10. What is inflammation?
11. What is blood poisoning?
12. How would you prevent pus germs entering a wound?
13. What does the word "symptoms" mean?
14. What are the symptoms of inflammation in a wound?
15. When do they come on and what should you do if they appear?
16. What are the varieties of wounds?
17. What are the symptoms of wounds?
18. What are symptoms of hemorrhage?
19. How would you treat a wound without severe hemorrhage?
20. Why should one try to make a trivial wound bleed?
21. Treatment of wounds with severe hemorrhage?
22. How would you know whether bleeding comes from an artery, a vein, or from capillaries?
23. How would you treat arterial hemorrhage; venous hemorrhage; capillary hemorrhage?
24. What are varicose veins and how would you treat bleeding from them?
25. What is internal hemorrhage; how would you treat it?
26. How would you treat nose bleed?
27. Treatment of abdominal wounds?
28. Treatment of wound in which a splinter remains?
29. Treatment of a wound of the eye? How would you remove a foreign body from the eye?

### PRACTICAL EXERCISES.

The pupils should be required to treat all the dislocations and fractures described in the preceding chapter.

Have each member of the class show where he would make pressure in bleeding from the different arteries.

## CHAPTER VI.

### INJURIES FROM THE LOCAL EFFECTS OF HEAT, COLD, AND ELECTRICITY.

#### BURNS AND SCALDS, INCLUDING BURNS FROM ELECTRICITY FROST-BITE.

##### BURNS AND SCALDS.

###### **Description.**

Burns result from exposure of the body to dry heat, such as a fire, while scalds are produced by moist heat in the form of hot water, steam, etc. With either, the injury may be confined to the skin alone or it may extend deeper. With burns all the tissues of the body may be charred down to the bone and with scalds all the tissues may be actually cooked. With either the danger will depend upon the depth, extent and part injured as well as on the age of the injured person. Both burns and scalds of the throat and wind-pipe are especially dangerous, as the swelling of the injured part is likely to result in suffocation.

###### **Cause.**

Burns: Flames or fires, hot or molten metal, electric shock and explosions of gas or gunpowder.

Scalds: Steam, boiling water or hot oil.

###### **Prevention.**

The prevention of ordinary burns and scalds is rather a complicated subject, as it involves: (1) Prevention of fires.

(2) Putting out fires. (3) Rescue of persons at fires. (4) Extinguishing burning clothing. (5) Avoidance of danger from hot or molten metal; and (6) Methods to prevent explosions of gas and gunpowder.

### Prevention of Fires.

Many fires result from carelessness. The general principles governing their prevention comprise care in making sure to extinguish all burning objects before they are left where they may ignite other objects and in never putting lamps or the like where they may later set fire to something which is inflammable.

### Putting Out Fires.

A fire almost anywhere may be easily put out when it starts, whereas a very few moments' delay may result in so big a fire that nothing can be done to subdue it until it has burned everything inflammable within reach. It is clear, therefore, that everyone should act promptly in case of fire.

At first a fire may be smothered by a few buckets of water or by throwing blankets or woollen clothing upon it. Sand, ashes or dirt will all quickly smother a fire. One of these should always be used instead of water on burning oil, as water will spread the oil and the fire. Anything hanging should, when possible, be pulled down before attempting to smother the fire in it. A bucket brigade will often prove valuable in putting out a fire. This should consist of two lines of men from the nearest water supply to the fire. The men in one line pass buckets, pitchers or anything else that will hold water from one to another till the last man throws the water on the fire. He returns the buckets to the water supply by the other line. Remember that a draft will fan a fire and therefore keep everything closed as much as possible to prevent drafts.

### **Rescue of Persons at Fires.**

While searching through a burning place it will be best to tie a wet handkerchief or cloth over the nose and mouth. Remember that the air within six inches of the floor is free from smoke, so when unable to breathe crawl along the floor with the head low, dragging anyone you have rescued behind you. Crawl backward in the same way down a staircase or any slope.

### **Extinguishing Burning Clothing.**

If your own clothing catches on fire when you are alone, do not run for help as this will fan the flames and make them burn fiercer.

Lie down on the floor and roll up as tightly as possible in a rug, shawl, overcoat, blanket or other woollen cloth, leaving only the head out. If nothing can be obtained in which to wrap up, lie down and roll over slowly, at the same time beat out the fire with the hands. If another person's clothing catches fire, throw him to the ground and smother the fire with a coat, blanket, rug or the like.

### **Avoidance of Danger from Hot or Molten Metal.**

Naturally, only persons working about them are subject to burns from these sources. Common care and watchfulness will do much to prevent them.

### **Methods to Prevent Explosions of Gas and Gunpowder.**

The mixture of illuminating gas and air in certain proportions is a very explosive one. This is also true of the mixture of certain other gases with air. Any unprotected light will cause an explosion.

In handling gunpowder it will be best to have no matches in the pockets, and cigars, cigarettes, pipes and lights of every description are, of course, extremely dangerous.

## Symptoms of Burns and Scalds.

Severe burning pain.

Depending on depth of injury: Reddening of skin; formation of blisters, or destruction of the skin and some of the tissues beneath it.

Shock.

## Treatment.

When the skin is simply reddened:

Exclude air by a thin paste made with water and bicarbonate of soda (baking, not washing soda), starch or flour. Ordinary vaselin or carbolized vaselin, olive or castor oil, and fresh lard or cream are all good. One of the substances mentioned should be smeared over the burned part and on a cloth used to cover it. A light bandage should be put on to hold this dressing in place.

The services of a doctor will hardly be required for such injuries.

When blisters have formed:

Treatment may be the same, but if the blistering is very extensive it will be best to show this injury to a doctor.

Destruction of the skin and some of the tissues beneath it:

Deep burns require prompt attention from a physician. Pending his arrival they may be treated by the application of the dressing which has been described or like an open wound. A specially valuable dressing material for such burns, or in fact for all burns, is picric acid gauze which is applied in the form of a compress which should be bandaged in place like any other compress.

Treat shock.

Besides the burns which have been described, burns are frequently caused by strong acid and alkalis.



The symptoms of burns by acids and alkalies are the same as of burns caused by heat.

### **Treatment.**

With either, wash off as quickly as possible; best under a water tap.

**Acids:** While washing injury, have lime-water procured or make a mixture of baking soda and water or get soapsuds and apply freely. If acid has entered the eye, wash it as quickly as possible with water and then with lime-water.

**Alkalies:** Wash in same way as with acid burns. Neutralize with vinegar, lemon juice or hard cider. Lime burns of the eye should be washed out with a weak solution of vinegar and water or with olive oil.

With both acid and alkali burns, after neutralizing, treat like other burns.

In severe burns of this character always see a doctor, and when either acid or alkali has entered the eye secure the services of a doctor as soon as possible.

Treat shock.

## **ELECTRIC BURNS.**

The subject of electric shock is treated at length under the proper heading ( page 104). Here, however, it is necessary to call attention to the fact that the local effect produced by contact with an electric current is a burn. This burn may be superficial or deep, depending on the strength of the current and the duration of contact. Frequently such burns are deep. Treatment of electrical burns should be exactly the same as for other burns.

### **Warning.**

In all burns, whatever the cause, use care in removing the clothing. When the clothing sticks to a burn, do not drag it off, cut around the part that sticks and soak it off later with oil.

## FROST-BITE.

This is due to the local effect of cold on the body, parts of which freeze much as do certain other objects. The parts of the body which are most liable to frost-bite are the nose, ears, toes and fingers.

### Cause.

Cold; insufficient clothing; general weakness with poor circulation of blood.

### Prevention.

Protection of the body, especially the exposed parts named above with sufficient covering when it is necessary to expose yourself to intense cold.

Rubbing of any part of the body which becomes very cold in order to increase circulation.

### Symptoms.

In intense cold, frost-bite not infrequently occurs without one's knowing it, but usually the ears, fingers, etc., become painfully cold and then one suddenly realizes that they no longer have feeling.

The color of the frozen part is white or grayish-white.

### Treatment.

Object: To gradually bring the frozen part to its natural temperature.

Rub with snow or cold water. Then use warmer water gradually.

### Warning.

The use of heat at once may result in mortification or death of the frozen part.

## QUESTIONS.

1. What is a burn?
  2. What is a scald?
  3. Why are burns of the throat and wind-pipe specially dangerous?
  4. What are the general principles governing the prevention of fires?
- Suppose a fire occurs, how would you try to put it out?
5. How would you rescue a person in case of fire?
  6. How would you put out burning clothing?
  7. What are the symptoms of burns and scalds?
  8. Treatment: Very slight burns and scalds; where blisters have formed; very deep.
  9. What is the treatment of burns from strong acids and alkalies?
  10. What can you say of burns from electricity?
  11. What is frost-bite? What are the symptoms of frost-bite?
  12. How would you treat frost-bite?

## PRACTICAL EXERCISES.

Treatment of all classes of wounds including burns and methods of checking hemorrhage by the class.

## CHAPTER VII.

### UNCONSCIOUSNESS, PARTIAL AND COMPLETE; AND POISONING.

#### UNCONSCIOUSNESS.

Unconsciousness, of course, means lack of consciousness or, in other words, one who is unconscious knows nothing of his surroundings or of what is occurring. Perhaps no condition which the first-aid student may be called upon to treat may prove more puzzling than this. Unconsciousness may result from a number of different causes, so in order to give the proper treatment one must determine first what has caused his patient to become unconscious. Always make an earnest effort to do this by taking the surroundings into account as well as by examination of the patient.

Suppose, however, that you are unable to determine the cause of unconsciousness. At least make very sure that it is due neither to a poison, to bleeding nor to sunstroke, for each of these demands immediate special treatment. Then, unless it is necessary to give the special treatment, if the patient is pale and weak have him lie down with his head low and warm and stimulate him in every possible way; on the contrary, if the face is red and pulse is bounding and very strong, while the position for the patient should also be lying down, the head should be raised. No stimulants should be given in the latter condition and cold water should be sprinkled on face and chest.

The common causes of unconsciousness are shock, electric shock, fainting, alcoholic poisoning, apoplexy and injury to the

brain, sunstroke and heat exhaustion, freezing, suffocation, opium and carbolic-acid poisoning. A number of poisons besides those mentioned cause unconsciousness.

It should be remembered that while these all may cause complete unconsciousness they do not necessarily do so. That is to say, partial as well as complete unconsciousness may be due to the same cause.

### **Shock.**

(See page 49.)

#### **Cause.**

An injury.

#### **Prevention.**

Of injury.

#### **Symptoms.**

The history and probably the presence of an injury.

The symptoms given under the heading Shock.

#### **Treatment.**

As given.

### **Electric Shock.**

The more general use of electricity is making accidents due to it more common year by year. Even now the third rail and the live wire are responsible for many injuries and deaths. In mines especially the dangers from electricity are very great.

The ordinary trolley wire carries a current of about 500 volts and incandescent and arc-light currents run from 2500 to 3000 volts. The passage of these powerful currents through the body causes dangerous shock or even death.

**Prevention.**

The third rail is always dangerous, so avoid it.

Swinging wires of any kind may somewhere in their course be in contact with live wires, so they should not be touched.

Electric wires must always be carefully avoided.

**Symptoms.**

Sudden loss of consciousness when the electrical current passes through the body.

Shallow breathing and weak pulse.

If hands are in contact with a live wire, person may not be able to release them at first.

Burns of hands or other parts of the body are common.

Little difficulty should be experienced in making out cause of injury.

**Treatment.**

First, rescue; second, treat patient.

**Rescue.**

In some cases it will be possible to shut off current and this should always be done if it can be done quickly. Patient in contact with wire or rail carrying an electric current will transfer current to rescuer if he puts himself in the line of passage of the current.

Therefore, he must not touch the body of a person suffering from electric shock still touching a live wire or a third rail unless his own body is thoroughly insulated. Naturally, too, he must not himself, in attempting to aid the injured person, bring any part of his own body in contact with the live wire or other apparatus carrying the electric current. Moreover, he must act very promptly for the danger to the patient is much increased the longer the electric current is permitted to pass through his body. If possible, the rescuer should insulate himself by covering his hands with a mackintosh,

rubber sheeting, several thicknesses of silk, or even of dry cloth. In addition he should, if possible, complete his insulation by standing on a dry board or a thick piece of dry paper, or even on a dry coat. Rubber gloves and shoes or boots are still safer, but they cannot usually be procured quickly. If a live wire is under a patient and the ground is dry it will be perfectly safe to stand upon it and to pull him off the wire with the bare hands. But they should touch only his clothing and this must not be wet.

A live wire lying on a patient may with safety be flipped off with a dry board or stick.

In removing the live wire from the patient, or the patient from the wire, do this with one motion as rocking him to and fro on the wire will increase shock and burn.

A live wire may be safely cut by an axe or hatchet with a dry wooden handle and the electric current may be short-circuited by dropping a crowbar or poker on the wire. These should be dropped on the side from which the current is coming and not on the further side as the latter will not short-circuit the current before it has passed through the patient's body. Drop the metal bar, do not place it on the wire or you will then be made a part of the short circuit and receive the current of electricity through your body.

### **How to Treat Patient as soon as He has been Rescued.**

Many cases of electric shock from powerful currents will be hopeless from the beginning. It is impossible to tell this at first, however, and in every case, therefore, an attempt should be made to save the life of the patient by prompt treatment.

Send for a doctor.

Loosen clothing around neck, chest and abdomen. Place the patient on his back with a rolled-up coat, a small log or some other object of the same shape under the shoulders so as

to throw the chest up. Press on the left chest and upper part of the abdomen about twenty times per minute. Pressing down firmly then taking off pressure and then applying it again. This stimulates the heart as well as helps to start breathing. Pull out tongue by grasping it with a dry cloth. Have some one else hold it out. Or if alone, if possible, tie in this position with a bandage or rubber band over the tongue and under the jaw. The reason for pulling the tongue forward is because in

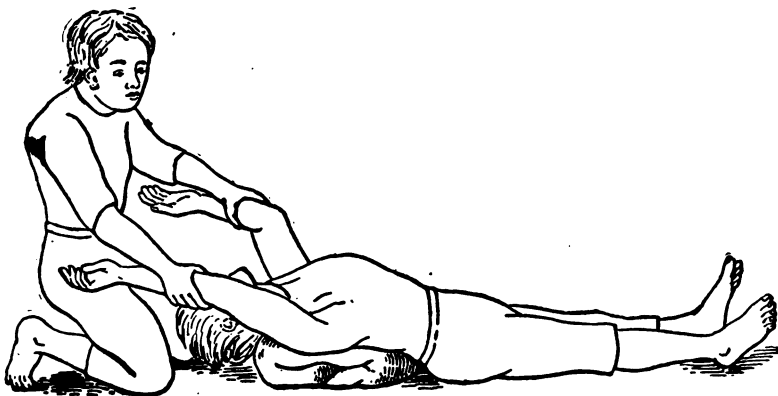


FIG. 39.—Artificial Respiration. First Movement. (*Buckley.*)

an unconscious person it is likely to fall back and block the windpipe. Perform Artificial Respiration. The Sylvester method is one of the best. Kneel just above patient's head, catch both his arms just below the elbows. Draw the arms outward and upward gently and steadily and hold them as far as they will go above head for about two seconds. This motion opens and expands the chest to the greatest possible extent. This is due to the fact that certain muscles are attached \*



both arms and ribs and when the arms are raised these muscles raise the ribs and so enlarge the chest.

Then bring the arms down till the elbows press against the chest; a little pressure will diminish the size of the elastic chest as much as possible. Do this for about two seconds.

Continue these motions about fifteen times per minute. Keep this up till the patient begins to breathe himself.

Artificial respiration when done properly is hard work for the

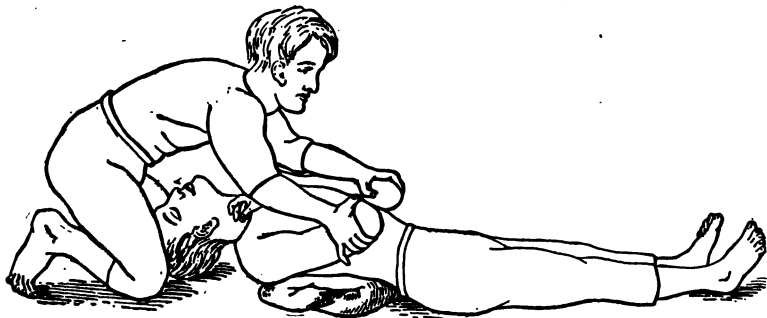


FIG. 40.—Artificial Respiration. Second Movement. (*Buckley.*)

operator and he should be relieved by some one else as soon as he grows tired.

Another excellent method of artificial respiration is called the "prone pressure method." The patient lies face down. The operator kneels by his side, places his hands across the lowest ribs and swings his body forward and backward so as to allow his weight alternately to fall vertically on the wrists and to be removed; in this way hardly any muscular exertion is required. The size of the chest being diminished forces the air from the lungs. The elastic chest then springs back and the air enters the lungs. The rate is fifteen per minute.

Artificial respiration should be kept up for at least an hour.

Ammonia on a sponge or handkerchief put under, but not on the patient's nose will help to revive him.

At the same time that one or two persons are performing artificial respiration, without interfering with them, others should cover the patient with a dry coat or blankets.

As soon as the patient begins to breathe himself, but not before, his limbs should be well rubbed toward the heart under the blankets. This will help to restore the circulation.

When the patient is partially restored he may have a chill and vomit. If he vomits while on his back he must be turned on his right side so that the vomited matter will not enter the windpipe.

He should afterward be put to bed well covered and surrounded with hot bottles. The windows should be opened so that he may have plenty of air.

After the danger is over the patient should be allowed to sleep quietly.

He will feel very nervous and shaken for a time and should be given absolute rest till he recovers from this condition. No food except hot beef tea should be given for several hours. Hot coffee, however, is useful as soon as the patient can swallow and retain it.

It is possible for those who have received an electric shock which does not render them unconscious to perform artificial respiration of a sort on themselves and so to recover without further treatment. This is done by raising the upper extremities and lowering them again and again while taking deep breaths.

Burns from electricity should be treated like other burns. See page 99.

### **Warning.**

If the breathing stops at any time after it has once begun you must immediately start again with artificial respiration.

## **Fainting.**

### **Cause.**

A lack of blood to the brain. Some persons often faint.

Fainting is common in any form of weakness, as when recovering from a severe illness. Some people faint at the sight of blood.

### **Prevention.**

A person who has not yet recovered his full strength after an illness or injury should be careful not to overdo physically. Persons who faint from trivial causes require the advice and treatment of a physician. Remember that fainting may be due to a hemorrhage, and if there is any reason to suspect that the patient is bleeding, examine him carefully and check the bleeding promptly.

### **Symptoms.**

Usually occurs in overheated, crowded places.

Patient becomes paler and paler and finally sinks to the floor unconscious.

Unconsciousness is partial or complete.

Face is pale, frequently covered with cold perspiration.

Pupils are natural.

Breathing is shallow and sighing.

Pulse is weak and rapid.

No other cause for unconsciousness.

### **Treatment.**

Sometimes can prevent fainting by having person who feels faint double over so that head is between knees.

If this does not prove effective at once do not continue.

Air, especially cold air, and cold water often prevent actual fainting when a person feels faint.

If patient has actually fainted, put him in lying-down position with his head lower than the rest of his body, so that brain

will receive more blood. Loosen clothing, especially around neck, for same purpose. Open windows, if necessary, and keep away crowd so that patient may get plenty of air. Sprinkle face and chest with cold water. Smelling salts or ammonia to nose. Rub limbs toward body. Do not allow patient to get up until fully recovered. May give stimulant when patient has so far recovered that he is able to swallow.

### **Alcoholic Poisoning.**

Alcoholic poisoning or intoxication represents the final stage in acute drunkenness; that is, the common spree.

Methods of prevention are clear without being discussed.

#### **Symptoms.**

Perhaps history of intoxication.

Unconsciousness, partial or complete; are frequently able to arouse patient to some extent.

Face usually flushed and bloated, but sometimes pale.

Skin cool and may be moist.

Pupils natural or large. Eyeballs red, but not insensitive to touch.

Breathing about as usual when in deep sleep.

Pulse, usually rapid and weak, but may be slow.

May be strong odor of liquor.

No paralysis.

#### **Warning.**

In practice insensibility from alcohol and apoplexy are more often mistaken one for the other than are any other forms of unconsciousness. The most important symptoms in which they differ are the state of the pupils, the sensitiveness of the eyeballs and paralysis. The odor of liquor on the breath is of no value, because a person with apoplexy may have been drinking.

**Treatment.**

If any doubt whether drunkenness or apoplexy, always treat for apoplexy and be particularly careful not to make patient vomit, as this will cause more bleeding into brain.

In drunkenness, if able to arouse sufficiently, give emetic—mustard and water or luke-warm water are usually easily procured.

Afterwards strong coffee or aromatic spirits of ammonia.

Hot bottles around patient.

Rub toward body to increase circulation.

Should send for doctor, as may prove dangerous.

**Apoplexy and Injury to the Brain.**

Apoplexy is due to the bursting of a diseased blood-vessel in the brain. The escaping blood presses on the nerve-centres and this causes the symptoms. An injury of the brain also injures these centres, so from a first-aid stand-point the symptoms and treatment of apoplexy and brain injuries may be considered under one head. Methods for preventing apoplexy are far too complicated for discussion here and, naturally, brain injuries are prevented like other injuries.

**Symptoms.**

Apoplexy often comes on suddenly.

In brain injury, may be history and evidence of injury to head.

In brain injury there may be hemorrhages from nose, ears, mouth and eyes.

Unconsciousness, complete.

Face: Red in apoplexy. Pale in injury.

Pupils, large and frequently unequal in size.

Eyeballs insensitive to touch.

Breathing, snoring.

Pulse: full and unusually slow.

Paralysis usually on one side of body. Test by raising arm or leg. If paralyzed, will drop absolutely helpless.

**Treatment.**

Send for doctor at once.

Rest and quiet, in a dark room if possible.

In lying-down position with head and shoulders high on pillows.

Ice or cold cloths to head. Hot bottles to limbs.

No stimulants.

**SUNSTROKE AND HEAT EXHAUSTION.****Sunstroke.**

This is a condition produced by excessive heat. It is a very dangerous one.

**Cause.**

Sometimes due to direct exposure to the rays of the hot summer sun, especially when the air is moist.

Most commonly due, however, to somewhat prolonged exposure to excessive heat while working indoors, especially if overfatigued.

Too heavy clothing is likely to help to cause sunstroke, and hats and caps which do not protect the head from the sun are dangerous.

Drinking any kind of alcoholic liquor before physical exertion with exposure to the summer sun is very apt to result in sunstroke.

**Prevention.**

Avoidance of exposure to sun in middle of day in summer.

The best possible ventilation of workrooms in summer, and avoidance of overfatigue as far as possible.

Light clothing for summer and light head-gear with space above head for ventilation.

Avoid alcohol before exposure to sun.

If one feels the first symptoms of sunstroke he can often prevent actual sunstroke by stopping work, finding a cool place, lying down, bathing face, hands and chest in cold water and drinking freely of cold water.

### **Symptoms.**

Usually before actual attack, pain in the head and feeling of oppression.

Unconsciousness complete.

Face red.

Pupils dilated.

Skin very hot and dry.

No perspiration.

Breathing labored and sighing.

Pulse slow and full.

### **Treatment.**

Consists in reducing temperature.

Send for doctor.

Remove at once to cool place.

Loosen and remove as much clothing as possible.

Apply cold to head and body. To do this, cold water or ice should be rubbed over face, neck, chest and in arm-pits. Is still better to put patient in a very cold bath or to wrap him in sheets wrung out in cold water which should be kept wet and cold with water or ice. If this is done, must rub continually to prevent shock and to bring hot blood to surface.

When consciousness returns, may be allowed to drink cold water freely.

Cold may be discontinued when consciousness returns, but if skin again becomes very hot, must renew.

No stimulants.

## Heat Exhaustion.

Though this condition is caused and prevented in the same ways as sunstroke, it is really quite different from it. Heat exhaustion is just what its name states—exhaustion or collapse due to excessive heat.

### Symptoms.

Great depression and weakness but not really unconscious.

Face pale and covered with clammy sweat.

Breathing shallow.

Pulse weak and rapid.

### Treatment.

Send for doctor.

Remove to cool place and have patient lie down in most comfortable position with clothing loosened.

No cold externally, but may sip cold water.

Stimulants, as tea, coffee, aromatic spirits of ammonia or small amount of brandy or whisky with a good deal of water.

## Freezing.

This condition is produced by long exposure to extreme cold.

### Cause.

Extreme cold.

Effect of which is increased by overexertion, hunger, alcoholic liquors and insufficient clothing.

### Prevention.

If you expect to be exposed to extreme cold, procure warm clothing sufficient in amount to protect you from its effects. Do not attempt a long journey in the cold without food and and do not make the journey so long that you are likely to have to stop and perhaps lie down on account of exhaustion.



Do not drink alcoholic liquors, for though they give a temporary sense of warmth, you will be more easily overcome by cold after this effect wears off.

If caught out without shelter in very cold weather use all your energy to keep moving. Lying down under such circumstances almost always results in freezing.

### **Symptoms.**

Circumstances should be taken into account. Depression is so great that appearance of patient is like that of a dead man.

### **Treatment.**

Object is gradually to restore warmth to the body.

Take patient into a cold room, rub limbs toward body with rough cloths wet in cool water, increase temperature of room if possible. This should be done gradually and cloths should be wet in warmer and warmer water. As soon as patient can swallow, give stimulant—coffee or tea in small quantities, frequently repeated with the addition of a little whisky, brandy, or aromatic spirits of ammonia.

Patient should not be placed before an open fire or in a hot bath until circulation has become active in cool room. You will know this by an increased force of the pulse, better breathing and more warmth and color in the skin.

### **Suffocation.**

(Especially Gas Poisoning.)

Suffocation may be caused either by something which blocks the windpipe and so prevents air from entering the lungs or by the inhaling of some fluid or gas other than air which by its presence prevents the air from entering the lungs. Moreover, such a gas is usually poisonous in itself. Hanging and choking are examples of the former condition and drowning and gas and smoke poisoning

of the latter. Every first-aid student should know how to treat a person who has been choked or nearly drowned. The treatment is essentially artificial respiration. In drowning, before artificial respiration is performed, mud and water should be cleaned from the mouth with a handkerchief on the finger and in order to drain the water from the throat and lungs the patient should be turned on his face, the hands should be clasped around his waist; he should be raised up by the middle and kept elevated for a few seconds.

The various forms of poisoning by gas are of great importance and especially so to miners and workmen in sewers and wells, nor are leaky gas fixtures in dwellings particularly uncommon.

### **Causes.**

A gas which produces suffocation and is also poisonous in itself: The common gases of this character are sewer gas, coal gas from furnaces or stoves, illuminating gas and smoke. The deadly back draft is caused by a fire in which the place becomes packed with smoke which contains many combustible matters which a draft of air causes to explode.

### **Prevention.**

Naturally is dependent on the cause. Extraordinary care must be taken wherever much gas is present.

In sewers and wells it is customary to lower a lighted candle or torch; if this does not burn it is certain that the air is so impure it will not support life.

Leaks in gas pipes should be promptly repaired. Be careful in turning off gas to make sure that gas is actually shut off.

It is dangerous to leave a gas jet burning faintly when you go to sleep, as it may go out if pressure in gas main becomes less, and if pressure is afterward increased, gas may escape into room in large amount.

Coal gas will escape through red-hot cast iron, and very big fires in such stoves are dangerous, especially in sleeping rooms.

Charcoal burned in open vessels in tight rooms is especially dangerous.

### Symptoms.

History of the presence of a gas or of escaping gas. First: headache, dizziness, throbbing of head, ringing in ears, spots before eyes, then gradually unconsciousness. Face and lips bluish.

Tongue blue, may be swollen and protruding between the teeth.

Skin pale or bluish. Nails blue.

Pulse weak and rapid.

Breathing intermittent.

With back draft, also severe burns.

### Treatment.

Send some one else for a doctor at once.

Rescue patient promptly and bring him to place where there is plenty of good air. To rescue an unconscious person in a place filled with gas, move quickly and carry him out without breathing yourself. Take a few deep breaths before entering and if possible hold breath while in the place. Frequently less gas will be found near floor. So, one may be able to crawl where it would be dangerous to walk.

Loosen clothing about chest and abdomen.

Perform artificial respiration, sprinkle cold water on face and chest, give stimulants as soon as patient recovers sufficiently to swallow.

## Poisoning by Opium or by Some Mixture Containing Opium.

### Symptoms.

May get history of having taken opium or may find bottle which contained poison.

Unconsciousness which comes on gradually and finally becomes complete.

Face red at first, finally dark purple. Lips bluish.

Pupils very small, like pin heads.

Breathing full and slow at first, gradually slower and shallow.

Pulse, slow and full, afterwards weak.

Possibly smell of laudanum on breath.

Symptoms that should be especially noted are pin-head pupils, character of breathing and patient is first very sleepy and then becomes unconscious.

### Treatment.

Give an emetic; mustard and water; salt and water; lukewarm water alone in large quantities. Exact dose is unimportant, give in large quantities and repeat if profuse vomiting does not occur. (May have difficulty in getting emetic to work). Plenty of strong coffee. Try to arouse patient by speaking loudly and threatening him, but do not exhaust his strength by compelling him to walk. Artificial respiration and stimulants.

## Carbolic Acid Poisoning.

### Symptoms.

History of poison or presence of bottle which contained poison.

Vomiting and great pain.

Skin covered with cold sweat.

If severe case, unconsciousness, usually followed promptly by death.

May almost always know by the strong smell of carbolic acid.

Lips, tongue and mouth are burned white by pure, and black, by impure carbolic acid.

#### **Treatment.**

Rinse mouth with pure alcohol. If grown person, should swallow 3 or 4 tablespoonfuls of alcohol mixed with an equal quantity of water. Follow this in five minutes with 2 tablespoonfuls of Epsom salts dissolved in a little water. Though not so good, lime-water may be used to rinse mouth, several glasses of it being also swallowed. Three or four raw eggs may be given or castor or sweet oil. Stimulants always, and keep warm.

### **POISONS.**

Any substance taken into the body which will cause death is a poison. But only poisons which are swallowed will be considered here.

#### **Prevention.**

Accidental poisoning may be prevented to a very great extent by never taking any medicine which is not properly labeled, and by putting poisons, when they must be kept on hand, in a safe place under lock and key.

#### **Symptoms and Evidences of Poisoning.**

The symptoms vary somewhat with the special poison. But there are certain evidences which indicate, in the majority of cases, that a poison has been taken.

Sudden and severe sickness in a person who has been in good health, after eating, drinking or taking medicine.

Possibly the patient has been melancholy or has talked of suicide.

The presence near the patient of bottles, glasses or the like in which some of the poison remains.

Frequently a person who has taken poison intentionally becomes frightened and is only too glad to tell some one that he has poisoned himself and what poison he has used.

In accidental poisoning the patient is, of course, willing to tell all he knows in reference to the poison.

If a number of persons who have eaten the same food become seriously ill after a meal, it is almost certain they are suffering from poison, probably decayed food or the so-called ptomaine poisoning.

### **Treatment.**

This has been discussed at some length on pages 111 and 119 for alcohol, opium and carbolic acid.

The general practice in the treatment of other poisons should be to give an emetic.

Send for a doctor at once and, if possible, have messenger tell him what poison has been taken so that he may bring the proper antidote.

Do not wait for doctor to arrive, but give an emetic to rid body of poison.

Good emetics are: Mustard and water, salt and water, luke-warm water alone in large quantities, ipecac. The doses of each are given under the heading Emetics. Do not waste time in getting the exact dose, however, and repeat if profuse vomiting does not result.

### **QUESTIONS.**

1. What does the word unconsciousness mean?
2. Suppose you found an unconscious person and you did not know what caused him to become unconscious, how would you treat him?
3. What are the common causes of unconsciousness?

4. How weak a current will cause dangerous electric shock?
5. Electric shock; prevention; symptoms?
6. What would you do to rescue a person in contact with a live wire?
7. How would you treat him after he had been rescued?
8. How would you treat a burn due to electricity?
9. Fainting: cause; prevention; symptoms and treatment?
10. Alcoholic poisoning: With what is this often confused and what would you do in order to prevent your making such a mistake?
11. Treatment of alcoholic poisoning?
12. Apoplexy and injury to the brain; symptoms and treatment?
13. Sunstroke; cause; prevention; treatment?
14. What is the difference between sunstroke and heat exhaustion?
15. Treatment of heat exhaustion?
16. Symptoms and treatment of freezing?
17. What is suffocation due to?
18. How would you treat a person who was apparently drowned?
19. What is back draft?
20. To what may gas poisoning be due?
21. Treatment of gas poisoning?
22. Treatment, suffocation from back draft?
23. What are the symptoms and treatment of opium poisoning?
24. Symptoms and treatment of carbolic acid poisoning?
25. Suppose you came across an unconscious person, what would make you think he had been poisoned?
26. What would be your treatment for a poison of which you did not know the exact character?

### PRACTICAL EXERCISES.

Artificial respiration.

## CHAPTER VIII.

### HOW TO CARRY INJURED.

A man trained in first aid will usually find when he has treated an injury that his duty is but half performed. Accidents usually occur in places from which it is absolutely necessary to carry patients, and unless the proper means for transporting them are understood and practiced very grave harm may result to them. In fact, the benefits from good first-aid treatment may be undone by bad transportation.

It should be understood, of course, that whatever method of transportation is adopted, first aid should be given before it is attempted, and that when necessary the clothing should be loosened so that it will not constrict the neck, chest nor abdomen during transportation.

The kind of transportation which should be furnished must, of course, vary widely with the character of the complaint. All serious cases of illness or injury should be carried on stretchers whenever it is possible to procure or to improvise them and in case of doubt it is always much safer when practicable to carry the patient lying down.

### STRETCHER TRANSPORT.

The ordinary type of stretcher is so well known that it hardly need be described. It consists of two long poles with a bed usually made of canvas between them and cross-pieces to keep the long poles apart and thus to stretch the canvas. The poles are long



enough to afford handholds for the bearers at each end of the stretcher. Fairly satisfactory stretchers may be improvised. The easiest one of these to make usually is the coat stretcher. For this two coats and a pair of poles are needed. The sleeves of the coats are first turned inside out and the coats are then placed on the ground with their lower edges touching each other, the poles are passed through the sleeves on each side, the coats are buttoned up



FIG. 41.—Coat stretcher.

and the buttoned side turned down. Two poles and a large blanket or rug may also be used to make a stretcher. The blanket or rug is spread on the ground with the two poles at the edges of its long sides. These edges are then rolled on the poles till a distance of about 20 inches is left between them. This stretcher may be turned over before being used, and especially with narrow blankets or rugs it is much safer to bind them to the poles with twine. With both these stretchers it is desirable, when possible,

to tie on two pieces of wood for cross-pieces so as to prevent the poles from approaching each other when the weight of the patient is put on the stretcher.

Instead of rugs and blankets, bags and sacks may be employed for stretcher beds. The bottoms of the latter should be ripped so that the poles may be passed through the number sufficient to give the length of stretcher required. With these and similar stretchers careful tests should be made before allowing them to be used for patients; care is also necessary to guard against accidents during transportation.

Numbers of articles, some of which may almost always be easily procured, may also be used for stretchers in case of necessity. Such articles are doors, window shutters, boards, bed frames, benches, ladders, mattresses, rugs, blankets and mats.

Whatever the type of stretcher used, the greatest gentleness should be observed in transferring the patient to it, and unless he is to be subjected to unnecessary suffering all his bearers must work in unison. The necessity for bearers working together has been so thoroughly appreciated by all the armies of the world that they all now give a regular stretcher drill to men charged with the duty of carrying wounded.

It is not absolutely necessary for every student of first aid to learn a drill but it is very desirable, as men knowing the drill can always work together better and without any confusion, to the great benefit of the patient.

The drill given here is modified from that of the United States Army.

## STRETCHER DRILL.

### Each Stretcher Squad Consists of Four Men.

1. **Fall In.**—The four men form in line and count off beginning at the right. No. 1 commands the squad and issues the orders.

In his absence No. 4 takes command; if Nos. 1 and 4 are both absent the duty falls on No. 3.

2. **Procure Stretcher. March.**—No. 3 steps one pace to the front and, facing in the direction of the stretcher, proceeds thither by the shortest route, takes the stretcher and places it on his right shoulder. He then returns to his place in line.

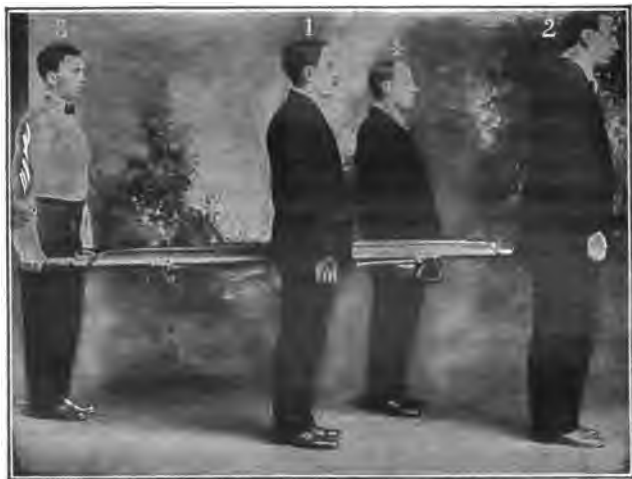


FIG. 42.—Carry stretcher.

3. **Carry Stretcher.**—No. 3 drops the upper handles forward with canvas to the left; No. 2 steps forward and catches the front handles with his left hand; Nos. 1 and 4 advance to the middle of the stretcher, to the right and left, respectively; Nos. 2 and 3 hold the stretcher between the hand and the hip, grasping the lower handles.

4. **Open Stretcher.**—Nos. 2 and 3 open the stretcher and arrange the braces. All the bearers take the position shown in Fig. 44, but with stretcher lowered to the ground.

5. **Close Stretcher.**—The movements are reversed and the position of "Carry Stretcher." is taken.



FIG. 43.—Patient lifted.

6. **Take Posts To Load Stretcher; March.**—Nos. 1 and 4 run ahead and take positions at the patient's right and left sides, respectively, examine the patient and give him first-aid treatment; Nos. 2 and 3 follow with the stretcher.

7. **Lower Stretcher.**—Nos. 2 and 3 lower the stretcher one yard from the patient's head and in line with his body. This command is given by No. 3. If the stretcher is not open before

giving the command "Lower Stretcher" No. 3 commands "Open Stretcher."

8. **At Patient's Right (or Left) Posts.**—Nos. 2 and 3 take posts at patient's right (or left) ankles and shoulders. They then assist Nos. 1 and 4 in first-aid work. When the patient is ready for the stretcher the next command given is:



FIG. 44.—Stretcher lifted.

9. **Prepare to Lift.**—All bearers kneel on the knee nearest the patient's feet, right for his right and left for his left; No. 2 passing both his arms under the patient's legs; Nos. 1 and 4 passing their arms under his loins and thighs; No. 3 passing one arm under his shoulders and the other under his neck to the further shoulder, thus supporting the head. In case of a fracture, the bearer nearest to it supports the part and looks after it.

10. **Lift Patient.**—All lift collectively and raise the patient slowly and gently to the knees of the three bearers who are in line; then the odd bearer, No. 1 or 4, arises and passing by the shortest route to the stretcher, grasps it by the middle, one pole in each hand, and places it in front of the bearers and against their ankles.

11. **Lower Patient.**—No. 1 or 4 stoops and assists the other bearers to lower the patient gently to the stretcher and then all resume their respective posts.

12. **Prepare to Lift; Lift.**—At Prepare to Lift, Nos. 2 and 3 stoop, place the slings over their shoulders—if the stretcher has slings—grasp the handles and at the word **lift** they rise and stand erect.

13. **March.**—With the lifted stretcher the bearers march with a short, sliding step of about 20 inches; Nos. 1, 2 and 4 step off with the left foot and No. 3 with his right, forming a “break step.” The patient is carried head first.

14. **Halt; Lower Stretcher.**—Nos. 2 and 3 lower the stretcher gently to the ground. When lowering or lifting a stretcher, the rear bearer must always watch the front bearer and move simultaneously with him.

### Unloading the Stretcher.

15. **Prepare to Lift.**—The bearers, standing at their respective posts, kneel and adjust their hands as in lifting to load the stretcher.

16. **Lift Patient.**—The bearers lift the patient to their knees and No. 1 removes the stretcher.

17. **Lower Patient.**—Nos. 2, 3 and 4 lower him to the ground, or, if he is to be put on a bed, or an ambulance bed, they rise from their knees and side-step to the bed, the stretcher having been placed one yard away and in line with the bed.

When there are only three bearers, the patient is lifted or lowered

to the knees of two, while the third places or removes the stretcher; or he may be carried on a two-handed seat, his legs being supported by the third bearer.

### **Position of Patient on the Stretcher.**

The position of a patient on the stretcher depends on the character of his injury. An overcoat, blanket, or other suitable and convenient article should be used as a pillow to give support and slightly raised position to the head. If the patient is faint the head should be kept low. Difficulty of breathing in wounds of the chest is relieved by a sufficient padding underneath. In wounds of the abdomen the best position is on the injured side, or on the back if the front of the abdomen is injured, the legs in either case being drawn up, and a pillow or other available object being placed under the knees to keep them bent.

In an injury of the upper extremity calling for stretcher transportation, the best position is on the back with the injured arm laid over the body or suitably placed by its side, or on the uninjured side with the wounded arm laid over the body. In injuries of the lower extremity the patient should be on the back, or inclining toward the wounded side; in cases of fracture of either lower extremity, if a splint cannot be applied, it is always well to bind both limbs together.

### **To Cross an Obstacle Such as a Wall.**

Lower the stretcher about three feet back from the obstacle. Nos. 3 and 4 grasp the stretcher poles at the end, one on each side; No. 2 climbs over the obstacle and receives the stretcher as it is passed over to him; Nos. 1 and 4 then climb over and again taking the stretcher poles pass it entirely over the obstacle; No. 3,

who has been holding the head of the stretcher at this time, now climbs over, they to resume their former positions and proceed.

Transportation along narrow passages or a ditch is effected by Nos. 1 and 4 bestriding the stretcher in a narrow place or descending into the ditch to support the stretcher. If the ditch be



FIG. 45.—Crossing an obstacle.

deep and wide, the stretcher must be halted and lowered with the handles near the edge; then Nos. 1 and 4 descend and proceed as before.

### To Load an Ambulance or Wagon.

Carry the stretcher, with the patient's head foremost, to within one yard of the rear of the ambulance and lower the stretcher to



the ground; Nos. 1 and 3 take positions at the patient's right and left shoulders, respectively. At the command **prepare to load** No. 2 faces about and stooping, grasps his handles, and Nos. 1 and 3 the poles on their respective sides. No. 4 opens the doors and sees that everything is in proper condition.

At the command **load**, the bearers lift the stretcher to the height of the ambulance floor and advance, keeping the stretcher level. The legs of the stretcher are placed on the ambulance floor by Nos. 1 and 3, the stretcher is pushed in by No. 2 assisted by the others.

Whenever it is possible all the bearers should accompany the ambulance, Nos. 1 and 3 occupying the seats inside, No. 2 inside at the patient's head, and No. 4 standing on the footboard outside.

### To Unload an Ambulance or Wagon.

At the command **prepare to unload**, No. 4 opens the doors if necessary, No. 2 grasps the handles of the stretcher and at the command **unload**, draws out the stretcher, assisted by Nos. 1 and 3 who, facing inward, support the poles until the inner handles are reached. The stretcher must be kept level and lowered about a yard from the vehicle. Then No. 4 closes the doors and all take their posts at the stretcher.

### GENERAL DIRECTIONS.

In moving the patient either with or without the stretcher, every movement should be made deliberately and as gently as possible, taking special care not to jar the injured part. The command **steady** will be used to prevent undue haste or other irregular movements.

*The loaded stretcher should never be lifted or lowered without orders.*

Should your patient have a broken bone be particularly careful that he is not jolted. A little intelligent care will prevent this.

Never carry a stretcher on your shoulders.

Always carry a patient feet foremost except when going uphill. But in cases of fracture of the leg or thigh if he has to be taken down a steep hill carry him head foremost, keeping him as nearly level as possible.

Wherever obstacles are in your path go around them, for every time a patient is set down or lifted it gives him additional pain.

Only when the crossing of obstacles is unavoidable, as where a fence cannot be torn down, a breach cannot be made in a brick wall or cars cannot be gotten out of the way should they be crossed as provided on page 130.

Accompanying all accidents there is a certain amount of shock, which induces a sensation of cold, so that even at midsummer injured men sometimes shiver with cold. Therefore, it is important that the patient be well covered with blankets or whatever clothing may be handy, whether the season be summer or winter.

All commands should be given in a low tone, but distinct enough to be heard by all the bearers.

It should be the duty of the bearers to keep at a respectful distance the morbidly curious people who are always attracted by accidents, who ask questions, shut out fresh air and do many other things detrimental to the patient.

Time being an essential factor in accidents, the patient should be borne to his home or a hospital without unnecessary delay. With this end in view, the ambulance driver should drive as fast as the condition of the road and comfort of the patient will permit, exercising special care and driving slower where the road is bad.

It is also important that a physician be notified as early as possible, and equally as important that at the same time he be

informed of the nature of the accident. Due attention to this matter may prevent fatal results.

When wagons or other vehicles must be used in place of an ambulance always, if possible, put plenty of straw, leaves, or boughs on the floor so as to reduce the jolting.

## TRANSPORTATION WITHOUT A STRETCHER.

Not infrequently in accidents it will not be possible to procure a stretcher for the patient. The first-aid student should therefore learn good methods of procedure under such circumstances as lack of knowledge in this particular will subject the patient to risk of further injury and to a great deal of unnecessary pain.

### With Two Bearers.

If the injured person be unable to walk, has not lost consciousness, and can use his arms, a good plan to adopt is the four-handed seat or "lady's chair" of children. To form it two men grasp each his left wrist with his right hand, and with his left hand grasps his fellow's wrist. Seated on this, the patient throws his arms over the shoulders of the bearers.

A two-handed seat is more comfortable, both for the patient and the bearers. The right-hand bearer grasps with his right hand the left wrist, and with his left hand the right shoulder of his fellow-bearer; the left-hand bearer grasps with his left hand the right wrist of his fellow, and with his right hand the left shoulder. (See Fig. 46.)

Still another method which requires no effort on the part of the patient, but is not applicable to severe injuries of the limbs, is called carrying by the extremities. For this one bearer takes position between the patient's legs and the other at his head, both facing toward his feet.



FIG. 46.—Two-handed seat.



FIG. 47.—Assisting to walk.

The rear bearer raises the patient to a sitting position, clasps him from behind around the body under the arms, while the front bearer, standing between the legs, passes his hands from the outside under the flexed knees. Both rise together.

### **With One Bearer**

There are four methods for this:

1. The bearer merely assists the patient to walk.
2. The patient is carried in the bearer's arms.
3. The patient is carried across the bearer's back.
4. The patient is carried astride the bearer's back.

#### **No. 1, Assisting to Walk.**

The patient is probably suffering from a comparatively slight injury of the upper part of the body, his legs uninjured. Stand by his side; put his sound arm over your shoulder and behind your neck; grasp his hand with your own and pass your other arm around his waist to support him. A single bearer may thus, if necessary, assist two slightly injured persons. (See Fig. 47.)

#### **No. 2, Carrying in Arms.**

The patient is lying on the ground probably insensible, and totally helpless.

The bearer, turning patient on his face, steps astride his body, facing toward the patient's head, and with hands under his arm-pits lifts him to his knees; then clasping hands over abdomen, lifts him to his feet; he then with his left hand seizes the patient by the left wrist and draws left arm around his (the bearer's) neck and holds it against his left chest, the patient's left side resting against his body, and supports him with his right arm about the waist. (Fig. 47.)



FIG. 48.—Carrying in arms.

From this position the bearer with his right arm upon the patient's back passes his left under thighs and lifts him into position, carrying him well up. This method is very easy for the patient but hard on the bearer; therefore, it is used only when the patient is insensible and his destination not distant. (Fig. 48.)

### No. 3, Carrying Across Back.

The patient is first lifted erect as described in previous paragraph, when the bearer with his left hand seizes the right wrist of the patient and draws the arm over his head and down upon his left shoulder, then shifting himself in front, stoops and clasps the right thigh with his right arm passed between the legs, his right hand seizing the patient's right wrist; lastly the bearer with his left hand grasps the patient's left and steadies it against his side, when he rises. This method is comfortable for the patient and easy for the bearer and is particularly recommended when the patient is not insensible, but is unable to render his bearer any assistance. (Fig. 49.)

### No. 4, Carrying Astride of Back.

The patient is lifted erect (as described), when the bearer shifts himself to the front of the patient, back to the patient, stoops and grasping his thighs, brings him well upon his back.

As the patient must help himself by placing his arms around the bearer's neck, this method is impracticable with an unconscious man.

In lowering the patient from these positions the motions are reversed. Should the patient be injured in such a manner as to require these motions to be conducted from the right side instead of left, as laid down, the change is simply one of hands—the motions proceed as directed, substituting right for left and *vice versa*.

A patient astride the back of a bearer may, when necessary,





FIG. 49.—Carrying across back.

be carried up a ladder, though with considerable difficulty. A better method is sometimes used, especially in mines. This requires an apparatus which consists of a wide belt which is held just below the armpits of the bearer by suspenders over the shoulders. From the belt a wide band leads to join the belt on the opposite side. The patient sits in this band supporting himself partially by his hands on the bearer's shoulders.

### QUESTIONS.

1. When would you use a stretcher for a patient?
2. What position would you put the patient in on a stretcher?  
Usually; if fainting; if abdomen is injured; if leg is broken?
3. When is command steady given?
4. Is patient carried head or feet foremost?
5. What would you do to prevent shock to patient on stretcher?

### PRACTICAL EXERCISES.

(In all these exercises in which the services of more than one man are required, one man should be selected to take charge and should give the necessary directions to his assistants.)

1. Make a coat stretcher.
2. Fall In; Procure Stretcher. March; Carry Stretcher.
3. Open Stretcher; Close Stretcher.
4. Take Posts To Load Stretcher. March; Lower Stretcher; At Patient's Right. Posts; Prepare To Lift. Lift Patient; Lower Patient.
5. Prepare To Lift. Lift; March; Halt. Lower Stretcher.
6. Unload stretcher by command.
7. Cross a wall with loaded stretcher
8. Load an ambulance.
9. Unload an ambulance.
10. Carry a patient with two beare
11. Assist patient to walk.
12. Carry in arms.
13. Carry across back.
14. Carry astride of back.

## CHAPTER IX.

### INJURIES AND EMERGENCIES OF IN-DOOR AND OUT-DOOR SPORTS.

1. GYMNASIUM. 2. BASEBALL. 3. FOOTBALL. 4. CELEBRATION OF JULY FOURTH. 5. BOATING, SKATING AND SWIMMING. 6. SHOOTING AND FISHING. 7. AUTOMOBILE. 8. CAMPING AND SUMMER OUTINGS.

As it is now universally admitted that great physical benefit results to those who engage in healthy sports, the possibility of injuries occurring therein should not be given too heavy weight. The man or boy who enters a physical contest will not go far if he has always before his eyes the possibility of accident. In sport, just as in everything else in life, the successful contestant is he who puts all his energy into making the best possible showing and nothing that is said here should be taken to mean that he should not do this. The risks run are but part of the game and should be accepted as such. Remember that foolhardiness is not courage, however.

There is also one other point which is worthy of consideration here. Violent physical exertion should be gradually prepared for and not rushed into without preparation. A man who is soft has not only soft voluntary muscles, but the muscle of his heart is also soft so that it may be easily strained with ~~perhaps~~ permanent injury. Many of the accidents which we read of as occurring to those engaged in sports are due to their poor physical condition.

A man or boy in good training has firm muscles which, to a great extent, prevent his internal organs from blows and falls. Soft muscles cannot do this and with them a trivial blow may prove dangerous.

## I. GYMNASIUM.

Bruises, strains, sprains, dislocations, and fractures are the commonest gymnasium accidents. The section devoted to these subjects should therefore be studied in connection with them. Boxing is of course responsible for many bruises, especially black eye, which should be treated by the application of cold water or a cold knife-blade. The so-called "alum curd" made by putting powdered alum in milk till a curd is formed is also an excellent application. Both cold and alum contract the vessels and so prevent the escape of more blood. Persons said to be knocked out by blows or falls in gymnasiums will in almost all cases be found to be suffering from shock and should be so treated.

## 2. BASEBALL.

Severe injuries of the head are sometimes caused by being struck by balls or bats. Blows in the abdomen are also not uncommon. Both should be treated like any other severe injury of the same general character. The services of a doctor should be secured as soon as possible.

Bruises are more common but their treatment is not peculiar.

Injuries of the hands and fingers are the commonest baseball injuries. Dislocated and fractured fingers are treated just as are these injuries from other causes.

The name "split finger" is given to the splitting down of the web between the fingers and also to the splitting of the soft tissues of the fingers themselves. Split of the web between the fingers generally makes a clear-cut wound which often bleeds freely. The

best way to treat it is to bring the two fingers together and to bandage them in this position without putting anything in contact with the wound itself. This injury should be shown to a doctor.

Splits of the fingers themselves are best dressed with a piece of gauze and a bandage. A surgically clean bandage may be put directly on such a wound. Severe splits of this character should also be shown to a doctor. Shock is sometimes severe in these injuries and should be treated.

The finger-nails are frequently torn partially off by base balls. They should be replaced and held in place by a strip of rubber plaster.

Wounds of the legs and feet, and sometimes of the hands, from the spiked shoes worn by baseball players, are common. So common, that it is a serious question if it would not be better to do away with spikes by rule. These spikes make very nasty wounds. After the clothing or shoes and stockings have been removed the part should be immediately covered with gauze and a bandage. Like other wounds, touching such wounds with the hands is likely to prove dangerous.

Shock must often be treated.

These injuries demand attention from a physician.

Emergency supplies are now usually kept at hand by professional and college teams. All that are needed are a few narrow gauze bandages wrapped up so they are kept clean, two Red Cross first-aid packets, a roll of rubber plaster, a two-ounce bottle of aromatic spirits of ammonia, a sharp knife, a pair of scissors, and a few safety and common pins.

### 3. FOOTBALL.

This, on account of the very severe exertion involved, is the best example of a game which should not be played without careful and gradual preparation.

Bruises, strains, sprains, dislocations, and fractures are not particularly uncommon. They are treated exactly like such injuries generally. The knocking out of a football player is usually due either to shock or exhaustion. Men in fine condition recover from slight shock promptly and are again able to take part in the game. Exhaustion always requires rest, and when a man is visibly exhausted it will certainly be better for him, and probably for the eleven to which he belongs, to take him out of the game.

Of course, at big games doctors are, as they should be, available to treat football injuries.

#### 4. CELEBRATION OF JULY FOURTH.

This celebration is still so widely indulged in by young, and sometimes old, America, and the injuries resulting from it are so numerous that it is quite worthy of discussion here.

Burning powder in one way or another was formerly such a large part of the celebration of July Fourth that it had national sanction. Now, however, on account of the numerous injuries which resulted the movement for a sane Fourth is making greater progress year by year. Fortunately, too, for the youth of America even in localities which have not fully adopted the idea of a sane Fourth many of the more dangerous things which make a noise have been prohibited by law.

This matter may also, of course, be regulated to a considerable extent in the individual family and each mother and father should at least see that their children, according to their age, have only firecrackers or fireworks which they may set off with a reasonable degree of safety. So much has been said in the newspapers of recent years in reference to the dangers of lock-jaw from Fourth of July accidents that larger children are not generally deaf to warnings in regard to setting off firecrackers.

Burns, torn wounds from explosions and injuries to the eyes are the commonest Fourth of July accidents.

The careful father and mother should not scorn to take the precaution of obtaining a jar of carbolized vaseline and a half dozen gauze bandages in preparation for the Fourth. Torn wounds demand immediate attention from a doctor on account of possible danger from lock-jaw.

## 5. BOATING, SKATING AND SWIMMING.

Drowning is the only accident which will be discussed here.

### **Prevention.**

This will be spoken of under two heads: 1. Prevention of accidents that may result in drowning. 2. Rescue of drowning persons.

#### **1. Prevention of Accidents that may result in Drowning.**

Boating accidents are frequent in all parts of the country during the summer season. In order to do your part to prevent them—

Remember: A light boat is not intended for heavy seas; do not change seats except in a wide and steady boat, and above all things do not put yourself in the class of idiots who rock the boat. In case you are thrown into deep water by the turning over of a boat, or from any other cause, do not lose your presence of mind even if you cannot swim. Remember that the water will almost support your weight. Allow yourself to sink low so your nose is just above the water and support yourself by a hand on the boat. Even an oar under the chin will hold you up. If there is nothing which will help to support you, lie flat on the back with the arms stretched out. Especially in salt water with light clothing, one may float almost indefinitely in this position. To do so it is necessary to keep cool if the water or spray rises over the face moment-

arily. Throwing up the head, or still worse the limbs, to prevent this will result in your sinking.

At the seashore, unless you are a strong swimmer, do not go outside the life-lines and if the undertow is strong be careful that you do not walk out so far that you may be carried off your feet.

The art of swimming should be made a part of the education



FIG. 50.—1. Rescue of drowning person.

of every boy and girl. It is not enough to know how to swim a few strokes. One should at least be able to swim for a few moments while dressed.

Very cold water and very long swims are likely to result in the exhaustion of even a strong swimmer and are therefore hazardous unless a boat accompanies the swimmer.

## 2. Rescue of Drowning Persons.

If possible, do not attempt to rescue a drowning person in deep water by entering the water yourself. The best interest



of the drowning person are served when practicable by holding out or throwing something into the water on which he can support himself till he can be pulled ashore or reached in a boat. In case a person has fallen into deep water near the shore take an oar, a pole, a rope or even your coat and hold it out so the drowning person may grasp it. Life preservers, boxes, boards or logs may also be thrown into the

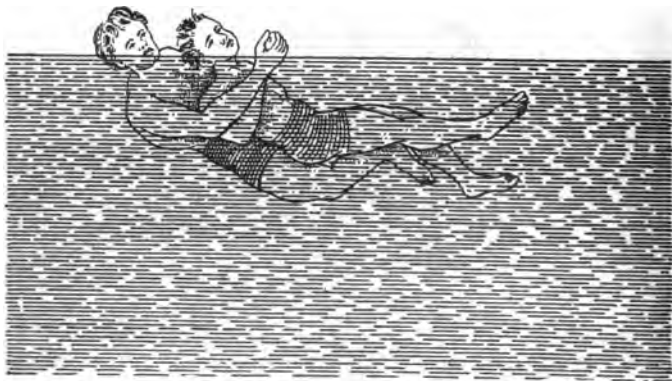


FIG. 51.—2. Rescue of drowning person.

water close to the person drowning. As has been stated above, a small, floating object is quite sufficient to sustain a person's weight in the water.

If the person in danger of drowning is so far from the shore that the methods just spoken of cannot be used you must enter the water to rescue him. Take off as much of your clothing as possible. It is especially necessary to rid yourself of your shoes. If you are not a strong swimmer it will be much better to support yourself with a life preserver, a board, box, or the like when swimming out to the drowning person.

Always take care not to permit him to grasp you, for this may result in drowning you both. If he succeeds in seizing you it will be safest to allow yourself to sink or to strike him a blow in the face in order to make him loosen his hold. There is no cruelty in such a blow; it may be his only salvation. Unconscious persons are in fact rescued much more easily.

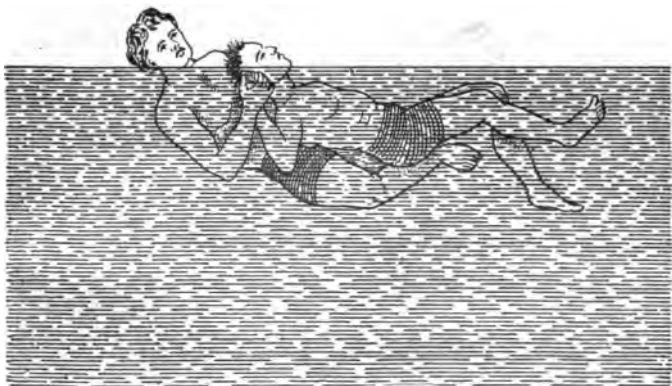


FIG. 52.—3. Rescue of drowning person.

Always approach a drowning man from behind, grasp his hair or collar with your left hand and his right shoulder with your right hand keeping him at arm's length with his mouth and nose just above the water, then "tread water." As soon as you can, seize his right wrist and pull it behind his head, then take a few strokes to get on your back, at the same time pull the person you are rescuing on your chest and start to swim backward to shore. Swim as low as possible, with your face and that of the drowning person, just out of the water.

To rescue a person who has broken through the ice: Yc

should first tie a rope around your body and have the other end tied, or held, on shore. Then secure a long board, or a ladder, crawl out on this or push it out so that the person in the water may reach it. If nothing can be found on which you can support your weight do not attempt to walk out toward the person to be rescued, but lie down flat on your

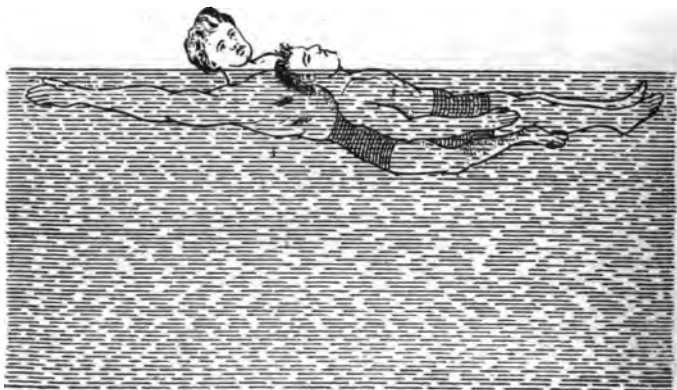


FIG. 53.—4. Rescue of drowning person.

face and crawl out, as by doing this much less weight bears at any one point on the ice than in walking.

### **Symptoms.**

Are of course those of suffocation. In addition a frothy fluid is often noticed in the mouth and nose and the body is cold.

### **Treatment.**

Is naturally that of suffocation in general preceded by that necessary to get rid of the water which has entered the wind-pipe and lungs. Also, afterward, necessary measures to restore warmth to the body.

In order that the proper treatment for drowning may be given promptly, the necessary directions should be posted at all boat-houses and bath-houses.

As soon as the nearly drowned person has been taken from the water loosen all tight clothing, at the same time send some one else for a doctor and for dry clothing and blankets when possible. Quickly clean mud or water from the mouth with a handkerchief on the finger.

Turn the patient on his face, clasp your hands around his waist, raise him up by the middle and keep him elevated for a few seconds in order to allow water to drain out of throat and lungs.

Turn the patient flat on his back.

Pull out tongue by grasping it with a dry cloth. Have some one else hold it out. Or if alone, if possible, tie in this position with a bandage or rubber band over the tongue and under the jaw. The reason for pulling the tongue forward is because in an unconscious person it is likely to fall back and block the wind-pipe.

Perform artificial respiration. This is described elsewhere in this book, but is repeated here for convenience of reference. The illustrations of the Sylvester method, an old and good method, are found on pages 107 and 108.

First put a pad, such as a rolled-up coat, under the shoulders. This helps to expand the chest. Do not allow the head to hang back so as to strain the wind-pipe; if necessary, a little pad under the head may be used to prevent this. Kneel just above patient's head, catch both his arms just below the elbows. Draw the arms outward and upward gently and steadily and hold them as far as they will go above the head for about 2 seconds. This motion opens or expands the chest to the greatest possible extent.

This is due to the fact that certain muscles are attached to both arms and ribs and when the arms are raised these muscles raise the ribs and so enlarge the chest.

Then bring the arms down till the elbows press against the



FIG. 54.—Prone-pressure method—pressure exerted.

chest, a little pressure will diminish the size of the elastic chest as much as possible. Do this for about 2 seconds.

Continue these motions about fifteen times per minute. Keep this up till the patient begins to breathe himself. Persons have been restored after several hours of artificial respiration and after they have been in the water for some time.

Artificial respiration when done properly is hard work for the operator and he should be relieved by someone else as soon as he grows tired.

Another excellent method of artificial respiration is called



FIG. 55.—Prone-pressure method—pressure relaxed.

the "prone-pressure method." The patient lies face down. The operator kneels by his side, places his hands across the lowest ribs and swings his body forward and backward so as to allow his weight alternately to fall vertically on the wrists and to be removed; in this way hardly any muscular exertion is required. The size of the chest being diminished forces the

air from the lungs. The elastic chest then springs back and the air enters the lungs. The rate is 15 per minute.

At the same time that one or two persons are performing artificial respiration, without interfering with them, others should remove the patient's wet clothing and dry him with towels or something else, then covering him with a dry coat or blanket.

As soon as the patient begins to breathe himself, but not before, his limbs should be well rubbed toward the heart under the blankets. This will help to restore the circulation. He should afterward be put to bed well covered and surrounded with hot bottles. The windows should be opened so that he may have plenty of air. When he can swallow, hot stimulants should be given him.

After the danger is over the patient should be allowed to sleep quietly.

### **Warning.**

If the breathing stops at any time after it has once begun you must immediately start again with artificial respiration.

## **6. SHOOTING AND FISHING.**

Shooting accidents are common and generally result from carelessness in the use of rifles or shot-guns.

### **Shooting.**

#### **Prevention.**

Never put a cartridge or shell into the chamber before you need it and always remove it when the need for it ceases.

Do not cock a gun except when you expect to shoot at any moment and uncock it when this necessity ceases. Never point a gun, whether loaded or unloaded, toward yourself or anyone else. Be particularly careful in going over or through fences, and in boats.

When hunting in company try to know where your companions are at all times and do not fire in that direction. Make sure in firing at anything in the woods that you are not shooting at a man.

### **Symptoms.**

Wounds from rifles have already been described as punctured wounds. Wounds from shot-guns received near the muzzle are tearing wounds with great destruction of the tissues and often actually tear off parts of the body. At a far distance shot may lodge just under the skin or may only produce a bruise with a stinging sensation.

### **Treatment.**

For the trivial injuries which have just been mentioned the services of a doctor are never immediately necessary, though when shot has lodged under the skin, a doctor should always remove it, as blood-poisoning may follow attempts to do so by other persons.

With serious shot-gun or rifle injuries circumstances are usually such that a doctor cannot be obtained promptly, though one should be secured as soon as possible. A comrade of the injured man will, therefore, almost always be compelled to give necessary treatment. This does not differ in any respect from the treatment of such wounds due to other causes. The bleeding may be very severe, however, and must be checked at any cost, even if the wound will probably be infected in doing so.

Shock always demands treatment.

### **Fishing.**

A fishhook caught in the flesh, if the barb is not engaged, is easily removed. If the barb is firmly fixed, however, quite the contrary is true. In this case the point of the hook should be



pushed through till the barb has passed through and out of the skin. The barb should then be cut off with a strong pair of nippers. Such a wound should, when possible, be shown to a doctor, as it is very likely to become inflamed. If this occurs a doctor's services are always required. In any event, the wound should be put in hot water, which, if possible, has been previously boiled, and squeezed so as to squeeze out poisonous matter. Such a wound should never be sealed with collodion or plaster, but should be dressed with a surgically clean or antiseptic compress or bandage.

## 7. AUTOMOBILE.

Automobile injuries are becoming increasingly common on account of the more general use of the automobile.

Such injuries are usually bruises, strains, sprains, dislocations, fractures, or wounds, and are likely to be very severe and of a crushing or mangle character.

### **Prevention.**

Every owner of a car should himself know or have some responsible person in his employ who is able to recognize whether his automobile is in fit condition to run with safety. Automobile accidents due to the most obvious defects in the mechanism of machines are far too common.

High speed, especially at night and on poor roads, is responsible for many accidents. Slippery roads demand especial care on the part of the driver, on account of the danger from skidding.

The use of alcoholic liquors by drivers of automobiles is as much, if not more, dangerous than similar indulgence on the part of locomotive engineers.

Grade crossings of railways should be approached by the automobilist with the greatest care, as accidents due to collisions with railway trains are very common.

Cranking, unless carefully done, is very liable to result in a fracture of the wrist or forearm.

The **Symptoms** and **Treatment** of automobile injuries need not be described as they are exactly the same as with similar injuries due to other causes.

## 8. CAMPING AND SUMMER OUTINGS.

A number of not closely related injuries and emergencies will be discussed under this heading. None is peculiar either to life in camp or to summer outings, but they all do occur more commonly under such conditions. As out-of-door active life is also not infrequently accompanied by injuries, such as bruises, strains, sprains, dislocations, fractures, and wounds, these should also be studied in this connection.

This section comprises: Sunburn, Mosquito bites, Stings of insects, Poison ivy, Plant poisons, especially Mushrooms, Bites of snakes, Injuries of feet, Cramps in legs.

### Sunburn.

This may vary from a slight redness of the skin to a very severe burn. Persons with delicate skins may avoid a good deal of needless discomfort and pain by protecting themselves when exposed to the bright summer sun. That there is anything healthy in sunburn or tan is a wholly false idea. The measures of protection are naturally the use of hats and clothing which shade the face and body from the sun. Wetting the face, especially with salt water, is likely to cause very severe sunburn. Any toilet powder will protect the face from the sun's rays to some extent, though the pink Calamid powder is undoubtedly the best.

The treatment consists of soothing applications; ordinary or carbolized vaselin may be used. An excellent application and

one easily prepared is 1 part lime-water to 3 parts almond or olive oil.

### **Mosquito Bites.**

These injuries are usually regarded as of trivial importance, but it is well to remember in malarial districts that malaria is caused by mosquitoes and that to prevent this disease mosquito nets and other means of protection against them should be used.

Ammonia is the best remedy, as the poison is an acid one. Lime-water with two drops of carbolic acid to the ounce is also good. Menthol and toilet powder often give temporary relief.

### **Stings and Bites of Insects and Spiders.**

These are rarely dangerous to life, though they may cause a great deal of pain and discomfort. Nothing need be said in reference to prevention or symptoms. Ammonia should be immediately applied to the part where the sting entered; this should be removed if it remains in the wound. Afterward cool, wet dressings should be used. Cloths wet with water in which a very few drops of carbolic acid have been thoroughly mixed, wet salt, and wet earth are all good applications.

### **Poison Ivy or Oak.**

These plants which so commonly cause skin poisoning belong to the sumac family. Two varieties are described—one, a shrub or small tree, with oval, pointed leaves arranged in clusters of from seven to thirteen on a common stalk; the other is a creeper or a climbing plant with broad leaves, sometimes slightly notched, arranged in clusters of three. Both have berries.

These plants cause poisoning in almost every one if touched, and some persons can scarcely go near them without being poisoned.

Early in an attack a person may convey the disease from one part of his body to another, and extremely rarely one person infects another.

### **Prevention.**

Is naturally avoiding poison ivy or oak. Remember there is no certainty that if you have handled these plants at one time without injury that the same will be true on another occasion.

### **Symptoms.**

Are those of a severe inflammation of the skin. This, of course, appears more often on the exposed parts, usually the hands and arms and the face. The skin becomes much inflamed and swollen, blisters form and even pus sometimes. There may be loss of the upper layers of the skin and a red, weepy surface. The pain, itching and discomfort are severe. The symptoms, as a whole, are very violent.

### **Treatment.**

If severe, a doctor should be consulted promptly. A very good and simple treatment is a wash of a two or three per cent. boracic acid solution followed by the ordinary zinc ointment. Lime-water for the wash and carbolized vaselin for the ointment are fairly good remedies. The ointment should be washed off daily with the wash, the part dried gently and the ointment reapplied.

### **Plant Poisons, Especially Mushrooms.**

A number of the common plants are poisonous. Among them are Bitter Sweet, Deadly Night Shade, Mountain Ash, Hemlock, Hellebore, Jamestown Weed, Wild Parsley and Lettuce and certain Mushrooms and Toadstools. Cases of poisoning, except from the last, are rare.

A rule which should always be observed is never to eat anything

growing unless you are very sure that you know that it is not poisonous and to prevent children from doing so.

Mushroom, sometimes called toadstool poisoning, is commonly due to failure to distinguish between the poisonous and non-poisonous varieties.

The rules which are commonly accepted for doing so are as follows:

Consider dangerous all mushrooms which have:

1. "A cup-like formation at the base of stem (so-called death cup)."
2. "A scaly or close-fitting layer at the base of the stem."
3. "Loose warts on the cap."
4. "A milky juice (unless this is red.)"
5. "Great brittleness, with gills nearly all of equal length and the flesh of the cap thin."
6. "A honeycombed appearance of the gills, if the flesh tastes bitter, or the mouths of the tubes are reddish, or the flesh changes color when cut or bruised."
7. "A cobwebby veil or ring when the plant is young."
8. "A slimy cap and clay-colored spores" (Dulles).

Moreover, all mushrooms that are decaying or are in the immature button stage should be discarded.

### **Symptoms of poisoning from Growing Plants.**

Nausea and vomiting. Severe pain in abdomen. Great depression. Unconsciousness, sometimes weak pulse, shallow respiration.

Delirium from some poisons.

### **Treatment.**

Send for doctor.

Cause vomiting.

Stimulants.

Rest in lying-down position, with head low.

Cover warmly and apply heat by means of hot bottles around patient.

### **Snake Bite.**

Snake bites are exceedingly rare injuries in this country, but bites from poisonous snakes are so rapidly fatal if not promptly given proper attention that it is necessary for the student of first aid to know how to treat them. The rattlesnake and the moccasin are probably most generally to be feared in the United States. Neither is equally virulent at all seasons of the year.

#### **Prevention.**

When it is impossible to avoid the localities where poisonous snakes are commonly found, comprises the wearing of high boots or leggings by day and sleeping on a cot or raised platform at night instead of on the ground. The Mexican plan when sleeping on the ground of surrounding the sleeper with a hair rope or lariat is undoubtedly a good one, as snakes will not cross such a rope.

#### **Symptoms.**

Great pain in the wound. Rapid swelling. Much depression and weakness, followed promptly by death in some cases unless proper treatment is given.

#### **Treatment.**

Immediately to tie a string, handkerchief or bandage between the bitten part and the body if this is practicable. Naturally, this can only be done in the extremities. This cutting off of the return of the blood to the body, of course, prevents absorption of the poison. The wound should then be soaked in hot water if this is obtainable and in any event squeezed, milked, or sucked. This is for the purpose of extracting as much poison as possible. Sucking the wound is not dangerous unless one has cuts or scrapes in the mouth. These procedures

should not be delayed for a moment in order to send for a doctor but one should be summoned as soon as possible. The further first-aid treatment consists of cauterizing or burning the wound with ammonia. Strong ammonia should be used for this purpose if it can be procured. The patient should also be dosed with stimulants. It is not necessary to give whisky or brandy so as to intoxicate him. But a large drink of whisky or brandy or a full dose of aromatic spirits of ammonia should be given at once and should be repeated as often as seems necessary to keep up the strength of the patient. Do not be afraid to give too much, for persons bitten by poisonous snakes require a large amount of stimulants.

Leave the string or bandage tied above the wound in place as long as you dare. After an hour, however, if no doctor has arrived you must remember that your tight bandage is likely to cause mortification as it has cut off circulation. Do not try to remove it at once, loosen it a trifle so that a little poison escapes to the body and then tighten it again and repeat after a few moments. If the patient does not seem to be greatly affected by the poison you will finally be able to remove the constricting band entirely. But, on the other hand, if the poison which escapes into the body seriously depresses the patient you must keep the bitten part tied off and take the chance of mortification.

### **Injuries of the Feet and Cramps in the Legs.**

The pleasures of a camping trip which requires much walking depend to a great extent on the condition of the feet.

The importance of well-fitting shoes cannot be overestimated. The shoes should have heavy soles, moderate heels, and be neither tight nor loose though they should be tightly laced and longer than the feet. New and stiff shoes are almost sure to be very uncom-

fortable; shoes should be worn sufficiently beforehand so that they will have adapted themselves to the shape of the feet. Cotton is the best material for the socks or stockings and they must be long enough so that the toes have free play. Great care should be taken to have any darns smooth. The feet should be carefully washed and dried after a day's walk and clean socks or stockings should be put on. If the feet are swollen or hot, wash them with warm salt water or alcohol before putting on fresh hose. Talcum powder will prevent foot troubles. In the morning dry the feet thoroughly, rub on the powder, and shake a good amount in each shoe.

Blisters are best treated by washing the foot thoroughly in hot water, then taking a clean needle and pricking the blister, not directly, but through the skin at the side, and gently pressing out the fluid in the blister till it is flat.

To toughen and harden the feet soak them for some time in a bowl of cold tannic acid solution, a tablespoonful of the acid to a bowl of water. A solution of alcohol and salt answers the same purpose.

Cramps in the leg-muscles often come on after unusual exertion. They are best treated by rubbing and kneading the muscles. Wrapping the legs in hot cloths will also assist.

The emergency supplies for a camp should, if possible, be those given on page 175 for the household. They may, however, be somewhat cut down in bulk and number in case of necessity. The minimum should be:

Aromatic spirits of ammonia, 2 oz. bottle, rubber cork.

Syrup of ginger, 2 oz.

Seidlitz powders, 12 in tin box.

5 Gr. bismuth subnitrate tablets (200).

$\frac{1}{10}$  Gr. calomel tablets (50).

Carbolized vaselin, 1 tin.



Oil of cloves, 1 drachm bottle, labelled "Poison."

Soda mint tablets, 50

1 Tin talcum powder.

1 Small package antiseptic gauze.

2 Red Cross first-aid outfits.

1 Box tooth wax.

1 Box tooth plaster.

1 Box corn plaster.

1 Sharp knife.

1 Pair scissors.

Needles and pins, ordinary and safety.

Thread.

### **PRACTICAL EXERCISES AND QUESTIONS.**

A general review which should include practical problems in first aid of general interest and of interest to the special class. As an example of a problem of the former kind the following is given: Four friends are walking along a country road and find a man who has been thrown from his horse. He is unconscious, his right thigh and left arm are broken. Treat him and move him fifty feet.

Questions should always be asked in connection with the problems so that the instructor may make sure the members of the class clearly understand what they are doing and the reason for each step.

## CHAPTER X.

### COMMON EMERGENCIES.

1. CRAMP OR COLIC. 2. DIARRHEA. 3. CONSTIPATION. 4. NAUSEA AND VOMITING. 5. HICCOUGH. 6. CHILL FROM EXPOSURE. 7. NERVOUS ATTACKS. 8. CROUP. 9. NEURALGIA OF FACE. 10. TOOTH-ACHE. 11. EAR-ACHE. 12. STYES. 13. PRICKLY HEAT. 14. CHILBLAINS. 15. CORNS.
- EMERGENCY SUPPLIES FOR THE HOME.

#### 1. CRAMP OR COLIC.

This condition is such a common one that it is almost unnecessary to describe it. As everyone knows, abdominal cramp is a severe pain in the abdomen which is not constant. The cramps may follow one another very rapidly or there may be some time between them.

##### Cause.

As has been explained under the head of anatomy there are a number of different structures in the abdomen. The common cramp is due to a spasm of the intestines caused by indigestible food, or by cold, especially when overheated in hot weather. More uncommon causes are appendicitis and gall or kidney stones.

##### Prevention.

As one of the commonest causes of cramp is indigestible food you should be careful to avoid this; unripe fruit and partially spoiled food are most dangerous. Even in very

hot weather the abdomen should be lightly covered, especially at night, and if one is subject to cramps they will often be prevented by the use of an abdominal band.

Prevention of cramp due to the other causes which have been mentioned is too complicated a subject for discussion except in medical books.

### **Symptoms.**

Severe cramping pain in the abdomen and shock in severe cases. If shock is severe, it is well to conclude that something more serious than intestinal cramp is present.

### **Treatment.**

A hot bottle placed on the abdomen or rubbing it will often give relief. Soda mint tablets, or even better, hot water with a little spirits of peppermint or syrup of ginger should be taken. Indigestible matter may be gotten rid of by vomiting or by a cathartic, such as a compound cathartic pill, salts, or a Seidlitz powder. If shock is severe always send for a doctor.

## **2. DIARRHEA.**

Is caused just as in the common type of abdominal cramp and naturally its prevention is the same.

### **Treatment.**

The object of treatment is to expel the indigestible matter from the bowels. This is best accomplished by giving  $\frac{1}{10}$ -grain doses of calomel, 15 minutes apart until 6 doses are taken and by following this after 8 or 10 hours by a Seidlitz powder or a dose of Epsom Salts.

After this if the diarrhea continues with considerable cramping pain a teaspoonful of syrup of ginger in  $\frac{1}{2}$  of a glass of water should be given after each passage. For painless diarrhea, 20 grains of subnitrate of bismuth, 3 times daily,

is a good and safe remedy. For children a dose of castor oil should be given instead of the remedies which have been mentioned.

The diet is also of great importance in diarrhea and nothing should be eaten which will furnish new food for fermentation or will irritate the digestive organs.

Milk in small quantities is the best food for both grown-ups and children. Boiling the milk is the wiser plan unless it is certain that it is very fresh and pure.

If the remedies mentioned do not cure the diarrhea it is much safer to consult a doctor. There are any number of so-called cholera cures on the market but the majority contain opium in some form and are therefore dangerous, especially for children.

### 3. CONSTIPATION.

Constipation may be prevented in most people. Persons inclined to be constipated should be careful to eat bulky food; oatmeal and the like are especially good as they irritate the intestines slightly. They should also drink plenty of water. Many persons too suffer from chronic constipation because they are careless and do not establish regular habits. Instead of always resorting to cathartics one who suffers from chronic constipation should try to get rid of the cause of this condition. To do this the advice of a doctor is required.

For acute constipation, six  $\frac{1}{16}$ -grain doses of calomel at intervals of 15 minutes, taken at night, and a Seidlitz Powder or a dose of Epsom Salts the next morning are excellent remedies.

### 4. NAUSEA AND VOMITING.

These are also usually due to indigestible food but may be caused by dyspepsia or nervousness.

**Treatment..**

When due to indigestible food, several large drinks of lukewarm water will usually cause free vomiting and will wash out the stomach, which is very desirable. The further treatment is the same whatever the cause. Patient should lie down in cool place. Hot applications to abdomen; cloths wrung out in hot water or a mustard plaster. A soda mint tablet or a little baking soda will usually stop both nausea and vomiting and in other cases sucking small lumps of ice will be found efficacious.

**5. HICCOUGH.**

Is usually due to overeating and indigestion. It is caused by a spasmodic contraction of the diaphragm, the great muscle which separates the chest from the abdomen. This is the reason that holding the breath as long as possible will usually cure it as the air in the chest forces the diaphragm down so it does not contract. Drinking a large glass of water in small sips without taking a breath has exactly the same effect. The reason that a scare stops hiccough sometimes is because this causes the patient to take a long breath. If none of these methods are successful, vomiting by removing the irritating material from the stomach will almost always cure the hiccough.

**6. CHILL FROM EXPOSURE.**

When one is exposed to the cold, especially to cold rain or snow, or falls into cold water he will often become what is commonly called "chilled through."

**Cause.**

This condition is due to the fact that the cold contracts the blood vessels of the skin, driving the blood to the interior of the body. This gives one the sensation of chilliness.

**Prevention.**

Is, of course, sufficient clothing and avoidance of exposure to cold.

**Symptoms.**

The sensation of cold. The lips become blue and the teeth chatter.

**Treatment.**

Remove the clothing, if possible, and put into a warm bed covering the patient warmly. Two or three hot bottles will warm the bed well. Rubbing his limbs and body will also bring the blood to the surface and so help to cure the chill. Hot drinks should also be given. Hot tea, hot coffee, hot milk, and hot lemonade, are all good.

## 7. NERVOUS ATTACKS.

These are usually a mild form of hysteria, and are more common in women. The patient usually has a fit of shivering and complains of feeling cold and upset. The treatment is exactly the same as that described for a chill from exposure.

## 8. CROUP.

This is a children's disease due to a spasm or contraction of the muscles of the upper air-passages. Children often have what is called a croupy cough whenever they catch cold. This is a hard ringing cough which is distressing but not particularly alarming except to parents, who fear, perhaps from previous experience, that an attack of true croup is coming on. Lighting the light, talking to the child, reading to him, or telling a favorite story will often result in the attack passing off and in the child becoming drowsy and finally going to sleep.

True croup is much more alarming though not often dangerous. The child has the ringing cough and croupy crow and becom

partially suffocated because sufficient air does not enter the lungs. The face becomes bluish and the child struggles to get its breath.

### **Treatment.**

Send for a doctor but do not wait for him to arrive. Such a child should at once be given an emetic. A teaspoonful of syrup of ipecac is best for this purpose or a  $\frac{1}{2}$  teaspoonful of powdered alum followed by a drink of warm water. Then cloths wrung out in as hot water as the child can stand should be put about the throat and on the chest. These should be covered with a piece of dry cloth, or, better, of oiled silk if this can be procured. Change these cloths as soon as they begin to grow cool, but do nothing further till the physician arrives.

## **9. NEURALGIA OF THE FACE.**

Some people are very subject to neuralgia or pain in some of the nerves of the face. This neuralgia may be due to the irritation of a bad tooth or to some other irritation less easily found, but unfortunately in certain people the cause cannot be discovered. Persons who suffer from attacks of neuralgia should always consult a doctor, but such attacks often come on suddenly when no physician can be obtained.

### **Treatment.**

Hot applications are usually better than cold ones and should always be tried first unless the patient knows from previous experience that cold will do him more good. Either hot water, or cloths wrung out in hot or cold water may be used. Painting the painful part with the ordinary menthol stick relieves many people. Some are benefited by the irritation produced by rubbing, and pressure on the painful nerve often gives temporary relief. If the neuralgia is due to a bad tooth

the proper emergency treatment of the tooth will frequently cure the neuralgia.

## 10. TOOTH-ACHE.

The prevention of decay of the teeth consists in the removal of all food from between them for such food ferments quickly, thus producing an acid which corrodes the teeth. The teeth should be brushed night and morning and after each meal, if possible. Dental floss should also be used if difficulty is experienced in dislodging particles from between the teeth with a brush.

Tooth-ache is due to decay and to food entering a cavity of a tooth where it decomposes and causes irritation and pain of the sensitive nerves.

### Treatment.

If the cavity can be reached, it should be cleaned out and afterward something put in it to deaden the nerve. To clean it, twist a very small piece of cotton around a toothpick or fine knitting-needle and put it in the hole in the tooth, twisting it around and around so as to clean out the cavity thoroughly. After this has been done another small piece of cotton should be dipped in oil of cloves and then gently put into the cavity on the end of the tooth-pick or needle. Tooth-wax is used in the same way. If the cavity cannot be reached, the aching tooth must be treated by an application to its gum between the latter and the cheek. A small piece of absorbent cotton soaked in spirits of camphor is excellent for this purpose. The burning caused by it is severe, but it will usually cure the tooth-ache. Tooth-plasters may be used in the same way. Of course, these are merely emergency measures, and because they cure the tooth-ache for the time being, this does not mean that it is safe for you to go on without the services of a dentist. You should realize that unless you have



proper attention, decay will go on in the tooth, you will have tooth-ache again, and will probably finally lose the tooth.

## II. EAR-ACHE.

This is particularly common in children, and may be due to bad teeth, to disease of the throat, or to trouble in the ear itself.

### Treatment.

The teeth should always be examined, and if a cavity is found it should be treated in the way already described. If nothing is found the matter with the teeth or treatment of bad teeth fails to relieve the pain in the ear, it will be necessary to try to stop the pain by treating the ear itself. Cloths wrung out in hot water, changed as soon as they begin to grow cold, or a hot-water bottle put on the face covering the outside of the ear will often cure ear-ache. Another method is to heat a cloth very hot and to pour a few drops of alcohol on its center and then apply this over the ear so that the alcohol fumes will enter the ear. Alcohol on a hot shovel is even better, but harder to use. Heating sweet oil just hot enough not to burn and then putting a few drops in the ear and introducing a small plug of absorbent cotton should be tried if the other remedies mentioned do not prove effective.

Severe ear-ache always demands the services of a doctor as disease of the inner ear may result in perforation of the eardrum, which may often be prevented by a physician if treated promptly.

## 12. STYES.

Styes are a local inflammation at the edge of the eye-lid, usually of the small glands there. As they commonly indicate ill health or an error of vision, a doctor should be consulted in order that he may give treatment which will prevent styes appearing again.

The pain of a styne may be diminished to a considerable extent by the use of compresses as hot as can be borne. If pus appears, a doctor should make the small cut necessary to permit it to escape.

### 13. PRICKLY HEAT.

Is the well-known irritating disease of the skin produced by heat. It is most common in children whose skin is very delicate and occurs in hot weather, not infrequently being due in part to too much clothing. It may be prevented to a great extent, even in the tropics, by not exercising so as to produce sweating and by avoiding heating drinks. A good talcum powder frequently applied also does much to prevent this annoying affection.

When prickly heat is severe the skin should be bathed with a mixture of one part of alcohol and three of water, afterward dusting on talcum powder. Lime-water with about two drops of carbolic acid to the ounce is an excellent application for prickly heat, as the carbolic acid numbs the nerves of the irritated and painful skin.

### 14. CHILBLAINS.

This common condition is caused by local chilling of some part of the body and is most frequently seen in old people with poor circulation. The most common places for chilblains are the heel, toes, ears, nose and fingers.

In susceptible people, as it is due to cold, it may be prevented by warm clothing and frequent bathing of the part of the body affected in warm water, afterward drying it with soft towels.

#### Symptoms.

They are the well-known red appearance of the skin, which appears when the part is brought near the heat, especially in winter after being in the cold. There is considerable burning and itching.

**Treatment.**

Paint every two or three days with tincture of iodine pure or diluted with alcohol. Several coats of collodion at intervals of a few days are also good, as the collodion exerts considerable pressure on the dilated blood-vessels. If these measures fail, it is best to consult a physician, as chilblains are sometimes very difficult to cure.

**15. CORNS.**

Corns are of two kinds—hard and soft. The former occur at the sides of the toes and at the sides and bottoms of the feet. Soft corns occur between the toes where the natural secretion makes the skin soft and pulpy. Both varieties of corns may be prevented by the most scrupulous cleanliness of the feet and stockings and by wearing well-fitting shoes which do not rub and so cause irritation of the skin which leads to the formation of a corn.

If a callous begins to form, rub the place gently with vaseline night and morning. Nitrate of silver stick will usually cause corns to disappear. An excellent corn remedy is one part of salicylic acid to three parts of simple cerate. Bathe and soak the foot in hot water for twenty minutes, dry and apply ointment; cover corn with cotton.

Hard corns should never be cut, but should be rubbed down smooth with sandpaper after washing the skin. They should then be covered with a corn plaster or a piece of adhesive plaster. Cutting a corn, if you get below the hard skin of the corn, is likely to prove very dangerous, as it often results in blood-poisoning.

Soft corns should be treated by careful washing and drying of the foot, especially between the toes, then dusting in a little talcum powder and keeping the toes separated by a small piece of gauze. A corn which has become inflamed requires treatment from a doctor on account of the danger of blood-poisoning.

## EMERGENCY SUPPLIES FOR THE HOME.

In every household, even in the middle of a city with drug stores near by, it is wise to have a few simple remedies and surgical dressings on hand. This is more especially the case if there are children in the household, as little people are so likely to hurt themselves and are much more liable to sudden illness than are grown-ups.

Neat emergency cases which fill all requirements fairly well may be purchased. Being especially made for the purpose, they possess the advantage of having a place for everything and everything in its place. They are rather expensive, however, and there is no reason, if you care to take the trouble, why you cannot buy your own box and fill it to suit your own particular requirements. The standard size for your bottles of liquid medicines had best be 2 ounces, and the square bottles should be used. The box should be just high enough to take a 2-ounce bottle corked, standing up, and big enough for all the supplies you need. Medicines prescribed by a doctor in illness are much better put in a safe place where they will not be meddled with, so it will be wise to leave space for them in your box. This may be made of metal or hard wood and should, preferably, have a key.

The supplies suggested for the ordinary first aid household box are as follows:

Alcohol.

Aromatic spirits of ammonia (rubber cork).

Castor oil.

Epsom salts (or  $\frac{1}{2}$  doz. Seidlitz powders).

Lime-water.

Mustard, powdered.

Sodium bicarbonate.

Syrup of ginger.

Syrup of ipecac.

Witch-hazel.

$\frac{1}{10}$ -grain calomel tablets (small bottle, 50-100 tablets).

5-gr. bismuth subnitrate tablets (100).

Carbolized vaselin (1 glass jar).

1 Drachm bottle oil of cloves (labeled "poison").

1 Bottle 50 soda mint tablets.

1 Tin talcum powder.

1 Small package antiseptic gauze.

$\frac{1}{2}$  Pound absorbent cotton.

6 Gauze roller bandages (3 large and 3 small).

2 Red cross first-aid outfits.

1 Roll oiled silk.

1 Roll old muslin.

1 Small bottle Collodion, with brush.

1 Box tooth-wax.

1 Box tooth-plasters.

1 Box corn-plasters.

1 Sharp knife.

1 Pair scissors.

Pins, ordinary and safety.

## QUESTIONS.

1. What are the commonest causes of colic?
2. How would you treat colic?
3. How would you treat diarrhea; constipation?
4. Treatment of nausea and vomiting?
5. Treatment of hiccough?
6. How would you treat chill from exposure to cold?
7. How would you know that a child has croup and how would you treat it?
8. How would you treat neuralgia of the face?

9. Treatment of tooth-ache?
10. Treatment of ear-ache?
11. How would you treat a sty?
12. How would you prevent prickly heat and how do you treat it?
13. Prevention and treatment of corns?

## PRACTICAL EXERCISES.

### General Review.



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